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DEVELOPMENT AND PILOT TESTING OF A METABOLIC SYNDROME INTERVENTION AMONG MARKET WOMEN IN ACCRA, GHANA

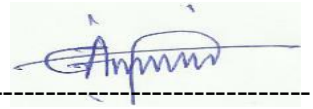
GLORIA ACHEMPIM-ANSONG

A THESIS SUBMITTED TO THE FACULTY OF HEALTH SCIENCE, UNIVERSITY OF THE WITWATERSRAND, IN FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

JOHANNESBURG, 2019

DECLARATION

I, Gloria Achempim – Ansong, hereby declare that except for references to other people's works which have been duly acknowledged, this thesis is the outcome of my own original research. It is being submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand. None of the materials in this write up has been presented either in whole or in part to any other institution for the award of any degree or certificate.

Signature  ----------

Gloria Achempim – Ansong

Date 30th October, 2019 ----------

ABSTRACT

Introduction: Metabolic syndrome (MetS) is considered to be a worldwide epidemic with high socioeconomic cost. MetS predisposes individuals to the risk of developing cardiovascular diseases, type 2 diabetes, stroke, and coronary artery disease. Studies have shown an increase in the prevalence of MetS among women globally and among Ghanaian women. Market work related factors such as physical inactivity and lack of proper nutrition due to preoccupation with trading activities, as well as lack of knowledge regarding the effect of this kind of work environment could predispose market women to the development of MetS. Even though various studies have been conducted on MetS, there is no evidence of a community-based intervention for improving health outcomes among market women in Ghana.

Purpose of the study: The study sought to develop and pilot test a metabolic syndrome intervention aimed at improving the quality of life of market women with MetS as well as those at risk of the syndrome in Kaneshie Accra, Ghana.

Research Methodology: The multi mixed method intervention design was used in the pre and post phases of this study. The study was implemented in three phases, made up of nine objectives.

In Phase 1, the knowledge and prevalence of MetS, relationship among demographics, knowledge of MetS and MetS predictors, quality of life of the market women and the women's opinion about practices that improve health were explored. Relationship among the QOL domains and MetS predictors was also established. An integrative literature review was also done to explore the MetS interventions employed by other researchers.

Phase 2 comprised the development and expert review of a MetS intervention programme aimed at improving the health outcomes and quality of life of market women with MetS as well as those at risk of the syndrome.

Phase 3 involved the pilot testing and evaluation of the health promotion programme.

Results: Analysis of the total knowledge score of participants before the MetS intervention revealed that, only 68(19.5%) had adequate knowledge of MetS and therefore scored above 50%. A significant majority of 280 (80.5) scored below 50%. Secondly, 100(28.7%) out of the total sample of (n=348) tested positive for Metabolic Syndrome, per the IDF criteria. Again, 48.3% were identified to be at risk for developing metabolic syndrome while 23% tested negative. Results of a Tukey test conducted to compare the pre and post intervention knowledge and prevalence of MetS as well as the quality of life of the market women revealed that there was a significant improvement in participants' knowledge, MetS parameters and quality of life after the MetS intervention programme.

Conclusion: The results of the study indicate that a three-month physical activity, diet and health education programme for market women with MetS, contributed immensely in reducing the incidence of MetS, improving their knowledge of Mets as well as their quality of life. There is therefore the need for regular screening for Mets as well as awareness creation of the general public on MetS.

KEY WORDS*: *Metabolic Syndrome, Prevalence of MetS, Knowledge of MetS, Quality of Life, MetS Intervention, Market Women.

DEDICATION

This work is dedicated to the Almighty God for having brought me this far.

It is also dedicated to my dear husband Mr. Alfred Achempim Ansong, my mum madam Kate Abankwa, and to my children Priscilla, Perry, Percy and Pearl Achempim- Ansong for their co-operation, support and encouragement.

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The Kaneshie market women who dedicated their time to participate in this study. The administrator and entire management of the Kaneshie market Complex, the market queen as well as the Doctors and Nurses at the Kaneshie Market Clinic for their time, assistance and guidance during the course of this research work.

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TABLE OF CONTENT

DECLARATION.....i
ABSTRACT ii
DEDICATION..... iii
ACKNOWLEDGEMENTS..... iv
TABLE OF CONTENT v
LIST OF TABLES xv
LIST OF FIGURES xviii
LIST OF ABBREVIATIONS.....xx

CHAPTER ONE: ORIENTATION TO THE STUDY.....1
1.1 Background and Rationale 1
1.1.1 Prevalence of MetS 3
1.1.2 Lifestyle and MetS 6
1.1.3 Knowledge of MetS 7
1.1.4 Prevention of MetS 7
1.2 The Kaneshie Market Complex 8
1.2.1 Organizational Structure of the Kaneshie Market 11
1.3. PROBLEM STATEMENT 14
1.4 RESEARCH PURPOSE 15
1.5 OBJECTIVES OF THE STUDY 15
1.6. SIGNIFICANCE OF THE STUDY 16
1.7 THEORETICAL FOUNDATIONS OF THE STUDY 17
1.7.1 Central Theoretical Statement 17
1.7.2 Meta-Theoretical Assumptions.....17
1.7.3 Theoretical Assumptions.....19
1.7.4 Definition of concepts 20
1.8 METHODOLOGICAL ASSUMPTIONS 24
1.9 OVERVIEW OF THE RESEARCH DESIGN AND METHODS 24

1.9.1 Research Setting 24
1.9.2 Research Design 24
1.9.3 Methods of Data collection and Analysis 25
1.10 THESIS STRUCTURE.....29
1.11 SUMMARY 31

CHAPTER TWO: CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW 32
2.1 INTRODUCTION 32
2.2 THE HEALTH PROMOTION MODEL (HPM) 32
2.2.1 Major Concepts of the Health Promotion Model 33
2.2.1.1 Definitions of the Components of the Model and Application in this study.....33
2.2.2 Key Concepts in nursing in relation to the Health Promotion Model.....37
2.2.3 Assumptions of the Health Promotion Model 38
2.2.4 Significance of the Health Promotion Model.....38
2.3 SUMMARY 39
2.4 LITERATURE REVIEW.....39
2.4.1 Prevalence of Metabolic Syndrome 41
2.4.2 Knowledge of Metabolic Syndrome 44
2.4.3 Quality of Life of People with Metabolic Syndrome 46
2.4.4 Mets and Sexual Dysfunction (SD) 47
2.4.5 Sleep and Metabolic Syndrome 47
2.4.6 Lifestyle and its Effect on Metabolic Syndrome 48
2.4.7 Environmental Risk Factors and MetS 49
2.4.8 Intervention for Metabolic Syndrome.....50
2.5 SUMMARY 51

CHAPTER THREE: RESEARCH DESIGN AND METHODS 52
3.1 Introduction 52
3.2 Research Setting 53
3.3 Research Design 53
3.4.1 The Multiphase Mixed Method Design 53

3.4.2 Intervention Studies 55
3.5.1 Knowledge of Metabolic Syndrome 57
3.5.1.1 Research Design 57
3.5.1.2 Study Population, Sample Size and Sampling Procedure 57
3.5.1.3 Inclusion and Exclusion Criteria.....58
3.5.1.4 Data Collection Instrument and procedure.....59
3.5.1.5 Measures of Instrument Validity and Reliability.....59
3.5.1.6 Data Collection Procedure.....60
3.5.1.7 Data Analysis.....62
3.5.2 Prevalence of Metabolic Syndrome 63
3.5.2.1 Research Design 63
3.5.2.2 Study Population, Sample Size and Sampling Technique 63
3.5.2.3 Data Collection Instrument.....63
3.5.2.4 Reliability of Anthropometric and Physiologic Measurements and Scales 64
3.5.2.5 Data Collection Procedure.....65
3.5.2.6 Data analysis.....66
3.5.3 Quality of Life Survey 66
3.5.3.1 Research Design 66
3.5.3.2 Study Population, Sample size and Sampling Process 66
3.5.3.3 Inclusion and Exclusion Criteria.....66
3.5.3.4 Data collection Instrument 66
3.5.3.5 Validity and Reliability Procedures.....67
3.5.3.6 Data Collection Procedure.....67
3.5.3.7 Data Analysis.....69
3.5.4 Opinions of the Women about Measures for Promoting Health. 69
3.5.4.1 Research Design 69
3.5.4.2 Study population.....70
3.5.4.3 Sample size and Sampling Method.....70
3.5.4.4 Data Collection Instrument.....70
3.5.4.5 Data Collection Method 70
3.5.4.6 Data Analysis.....71

3.5.4.7 Trustworthiness....71
3.5.5 Integrative Review....73
3.5.5.1 The Focused Review Question was formulated as....73
3.5.5.2 Sampling Procedure....73
3.5.5.3 Sources of Literature....74
3.5.5.4 Search terms/keywords....74
3.5.5.5 Inclusion and Exclusion Criteria....74
3.5.5.6 Data Analysis....74
3.6 PHASE TWO: DEVELOPMENT AND REVIEW PHASE....75
3.6.1 Development of the MetS Wellness Programme (Intervention)....75
3.6.2 The Mets Intervention Programme....75
3.6.3 Expert Review of the Health Promotion Programme....75
3.7 PHASE 3: IMPLEMENTATION (PILOT TESTING PHASE) / EVALUATION....76
3.7.1 Pilot Testing of the Intervention....76
3.7.2 Evaluation of the MetS Intervention Programme Outcomes....77
3.7.3 Primary Outcomes....77
3.7.4 Secondary Outcomes....77
3.8 RESEARCHER'S EVALUATION....77
3.9 ETHICAL CONSIDERATIONS....79
3.9.1 Institutional Permission to Conduct the Study....79
3.9.2 Data Collection Instruments....79
3.9.3 Informed Consent....80
3.9.3.1 Quantitative Studies (Pre and Post Intervention)....80
3.9.3.2 Qualitative Study - Focus Group Discussion....81
3.9.3.3: Protection of Study Participants....81
3.10 CHAPTER SUMMARY....82

CHAPTER FOUR: PHASE ONE: RESULTS OF KNOWLEDGE AND PREVALENCE OF METABOLIC SYNDROME, QUALITY OF LIFE OF WOMEN WITH METS, FOCUS GROUP DISCUSS AND INTEGRATIVE LITERATURE REVIEW....83

4.1 INTRODUCTION....83

4.2 SECTION A 83
KNOWLEDGE AND PREVALENCE OF METABOLIC SYNDROME 83
4.2.1 METHODOLOGY 83
4.2.2 RESULTS AND FINDINGS 84
4.2.2.1 Results of Knowledge of MetS 84
4.2.2.1.1 Demographic Features 84
4.2.2.1.2 Knowledge of Metabolic Syndrome Prevention (n=348) 94
4.2.2.1.3 DISCUSSION OF FINDINGS 98
4.2.2.2 Results for Prevalence of Mets 102
4.2.2.2.1 Age Distribution of Participants 103
4.2.2.2.2 Prevalence Data for Metabolic Syndrome among Participants (n=348) 104
4.2.2.3 Positive for Metabolic Syndrome Participants 117
4.2.2.3.1 Knowledge Level of MetS Prevention among Mets Positive Participants 120
4.2.2.3.2 POSITIVE FOR METABOLIC SYNDROME: PREVALENCE RATE 124
4.2.2.3.3: Descriptive Analysis of MetS Prevalence Variables for Participants Positive for MetS 125
4.2.2.3.4 RELATIONSHIP BETWEEN VARIABLES FOR POSITIVE FOR METABOLIC SYNDROME 126
4.2.2.3.4 DISCUSSION OF FINDINGS 128
4.2.2.3.4.1 Prevalence of Metabolic Syndrome among Participants 128
4.2.2.3.4.2 Metabolic Syndrome Indicators 131
4.2.2.3.5 Positive for MetS Participants (n=100) 135
4.2.3 SUMMARY 139
4.3 SECTION B 140
RESULTS OF QUALITY OF LIFE SURVEY AND OPINIONS OF THE MARKETWOMEN ABOUT MEASURES THAT PROMOTE HEALTH 140
4.3.1 Methodology 140
4.3.2 Results of Findings of the QOL Survey and Focus Group Discussion 141
4.3.2.1: Results for Quality of Life 141
4.3.2.1.1 Demographic Data and MetS Indicators of Participants (n=100) .... 141_Toc22218670
4.3.2.1.2 Quality of Life Results 144
4.3.2.1.3 Welch Two Sample T-Test for Mets Indicators and QOL Domains 154

4.3.2.1.4 Integrated analysis and discussion of the Quality of Life and Focus Group Discussion 159
4.3.2.1.5 Researcher's Reflections 180
4.3.3 SUMMARY 181
4.4 SECTION C 182
METABOLIC SYNDROME INTERVENTION PROGRAMMES: AN INTEGRATIVE LITERATURE REVIEW 182
4.4.1 Purpose of the Integrative Review 183
4.4.2 Research Design and Methods 183
4.4.2.1 The Five Stages of Conducting an Integrative Literature Review 183
4.4.2.2 Problem Identification and Question Formulation Stage 183
4.4.2.3 Literature Search Stage 184
4.4.2.3.1 Search Strategies used for the Study 184
4.4.2.3.2 Sources of Literature 185
4.4.2.3.3 Search Terms/Keywords 185
4.4.2.3.4 Inclusion and Exclusion Criteria 185
4.4.3 Data Collection Tool 185
4.4.5 Data Analysis 189
4.4.5.1 Data Reduction 189
4.4.5.2 Data Display 190
4.4.5.3 Data Comparison 190
4.4.5.4 Conclusion and Drawing Verification 190
4.4.6 PRESENTATION STAGE 190
4.4.6.1 Type of Journals 191
4.4.6.2 Year of Publication 192
4.4.6.3 Types of Research Design/Sample Size, Age Range of Participants 192
4.4.6.4 Levels of Evidence Provided in the Studies Included in this Review 193
4.4.6.5 Countries Where the Researches were Carried Out 195
4.4.7 THEMES AND SUB-THEMES EMERGING FROM THE DATA 196
4.4.7.1 Introduction 196
4.4.7.2 Theme 1: Types of Interventions 197

4.4.7.2.1 Sub-Category 1: Combination of Diet and Exercise Therapy (Multi-Component Intervention)

4.4.7.2.2 Sub-Theme 2: Physical Activity (Types of Physical Activity used for the Intervention) 199

4.4.7.2.3 Sub-Theme 3: Diet (Types of Diets used for the Intervention) 200

4.4.7.3 Theme 2. Duration of Intervention 201

4.4.7.3.1 Sub-Theme: Number of Weeks or Months 201

4.4.7.4 Theme 3: Effect/Results of the Interventions 204

4.4.8 DISCUSSION 206

4.4.9 CONCLUSION 209

4.5 SUMMARY 210

CHAPTER FIVE: PHASE TWO: DEVELOPMENT AND EXPERT REVIEW OF THE METABOLIC SYNDROME INTERVENTION 211

5.1 INTRODUCTION 211

5.2 DEVELOPMENT OF THE METS INTERVENTION PROGRAMME 211

5.2.1 The Mets Intervention Content 215

5.2.2: Expert Review of the Mets Intervention Programme 217

5.3 SUMMARY 220

CHAPTER SIX: PILOT TESTING, OUTCOME EVALUATION AND PATIENT SATISFACTION SURVEY 221

6.1 INTRODUCTION 221

6.2. INTERVENTION DESIGN AND STRATEGIES 222

6.3 Plan for Pilot Testing the Mets Intervention Programme 226

6.3.1 Project Management Plan 226

6.3.2 Training of Research Assistants 226

6.3.3 Preparation of Participants and the Registration Process 226

6.3.4 Setting and Equipment 227

6.4 PROGRAMME OF ACTIVITIES FOR THE PILOT STUDY 227

6.4.1 Formation of Support Groups 227

6.4.2 Exercises 228

6.4.3 Screening 228
6.4.4 Mets Awareness Day 229
6.5 Evaluation of the Mets Intervention Outcomes 232
6.5.1 Primary Outcome 232
6.5.1.1 Demographic Features of Participants in the Pilot Study (N=70), Frequency and Percentages 233
6.5.2 Secondary Outcomes 262
6.5.2.1 Knowledge of MetS 262
6.5.2.1.1 Data Collection Instrument 262
6.5.2.1.2 Data Analysis 262
6.5.2.1.3 Results and Discussion 263
6.5.2.2 Quality of Life 270
6.5.2.2.1 Data Collection Instrument 270
6.5.2.2.2 Data Analysis 270
6.5.2.2.3 Results and Discussion 271
SECTION B 294
6.6: POST INTERVENTION: PARTICIPANTS SATISFACTION SURVEY 294
6.6.1 Introduction 294
6.6.2 Sample size and sampling procedure 294
6.6.3 Data Collection Instrument and Procedure 294
6.6.4 Data Analysis 294
6.6.5 Results: 295
6.6.5 Discussion and Summary of Results of the Participants' Satisfaction Survey 297
6.7 RESEARCHER'S EVALUATION OF THE ENTIRE PROGRAMME 297
6.7.1 Process Evaluation: 297
6.7.2 Impact Assessment 298
6.7.3 Outcome Evaluation 301
6.8 SUMMARY 302
CHAPTER SEVEN: SUMMARY OF THE STUDY AND CONCLUSION, RECOMMENDATIONS AND LIMITATIONS 303
7.1 INTRODUCTION AND SUMMARY OF THE STUDY 303

7.2 SUMMARY OF RESULTS 305
7.2.1 Introduction 305
7.2.1.1 Demographic Finding 305
7.2.1.2 Knowledge of MetS 305
7.2.1.3 Prevalence of MetS 305
7.2.1.4 Quality of Life 306
7.2.1.5 Market Women's Opinions about Measures that Promote Health. 306
7.2.1.6 Results of the Integrative Literature Review 307
7.3 POST- INTERVENTION RESULTS 307
7.3.1 Knowledge of MetS 307
7.3.2 Prevalence of MetS 307
7.3.3 Quality of Life 307
7.4 CONCLUSION 308
7.5 LIMITATIONS AND CHALLENGES OF THE STUDY 309
7.6 RECOMMENDATIONS AND NURSING IMPLICATIONS 310
7.6.1 Community Health Practice 310
7.6.2 Clinical Practice 311
7.6.3 Education 311
7.6.4 Research 312
7.6.5 Policy makers 312
7.6.6 Implications related to knowledge translation, uptake and sustainability 312
7.7 CHAPTER SUMMARY 312
REFERENCES 313
Appendix 1 329
Appendix 1.I 330
Appendix 1.II 331
Appendix 2 332
Appendix 3 333
Appendix 3.I 334
Appendix 4 335
Appendix 4.I 338

Appendix 4.II 339
Appendix 4.III 342
Appendix 4.IV 343
Appendix 4.V 344
Appendix 4.VI 345
Appendix 5 346
Appendix 5.I 347
Appendix 5.II 348
Appendix 6 349
Appendix 6.I 351
Appendix 6.II 352
Appendix 6.III 353
Appendix 7 354
Appendix 7.I 355
Appendix 7.II 356
Appendix 7.III 357
Appendix 8 358
Appendix 8.I 370
Appendix 8.II 371
Appendix 8.III 372
Appendix 8.IV 373
Appendix 8.V 374
Appendix 8VI 375
Appendix 9 376
Appendix 9.I 377
Appendix 9.II 378
Appendix 9.III 379
Appendix 10 380
Appendix 10.I 381
Appendix 10.II 382
Appendix 10.III 383

APPENDIX 11.....384

LIST OF TABLES

Table 1. 1: A Summary of the Research Methods 28
Table 1. 2 Structure of the Thesis 31
Table 3. 1: Steps for the Data Collection Process.....62
Table 3. 2: Anthropometric Measurement Scales (Delport & Vander Sloten, 2015, Jarvis, 2012) 63
Table 3. 3 Physiologic Measurements 64
Table 3. 4: Summary of Data Analysis 78
Table 4. 1: Descriptive Analysis of Participants' Demographic data (%) (n=348).....85
Table 4. 2: Knowledge of Metabolic Syndrome Prevention. Frequency & Percentages (%) (n=348) 94
Table 4. 3: Prevalence Data of Participants (n=348) 103
Table 4. 4 Age Distribution of Participants by BMI (n=348) 109
Table 4. 5: Age Distribution by Metabolic Status 109
Table 4. 6: BMI Distribution by Metabolic Status (n=348) 110
Table 4. 7:Age Distribution by Metabolic Variables 111
Table 4. 8: Metabolic Status Variable by BMI 112
Table 4. 9: Descriptive Analysis of Mets Prevalence Variables (n=348) 113
Table 4. 10: Descriptive Analysis for MetS Indicators Positive for Mets, at Risk and Negative for Mets Participants.....114
Table 4. 11: Demographic Data (n=100) 117
Table 4. 12: Knowledge Level of Metabolic Syndrome Prevention among MetS Positive Participants (n=100) 120
Table 4. 13: MetS Parameters for Positive Participants (Prevalence, n=100).....124
Table 4. 14: Descriptive analysis of METS prevalence variables (positive for MetS, n=100) ...125
Table 4. 15: Age against Educational Level.....126
Table 4. 16: Age against Marital Status 127
Table 4. 17: Education Level against Marital Status 127
Table 4. 18: Demographics data (%) for MetS Positive Participants (n=100) 142
Table 4. 19: Reliability of the WHOQOLBREF 26(2005) tool 144
Table 4. 20 :Frequency Responses (%) for Facets of the WHOQOL-BREF (n=100) 145
Table 4. 21: Global Quality of Life (n=100) 150
Table 4. 22: Descriptive Analysis of the Domains of Quality of Life (n=100).....151
Table 4. 23: Pearson's Correlation Coefficient of Domains (n=100) 152
Table 4. 24: FBS and QOL Domains (n=100).....154
Table 4. 25: HDL and QOL Domains (n=100).....156
Table 4. 26: TRIG Glycerides and QOL Domains (n=100) 157

Table 4. 27: QOL Domains and METS Indicators (n=100) 158
Table 4. 28: Themes, categories and sub-themes identified -Focus Group Discussion 160
Table 4. 29: Combined results of the Quality of Life and Focus Group Discussion 161
Table 4. 30: Data Collection Tool (Sparbel and Anderson (2000) 186
Table 4. 31: Data Evaluation Stage 186
Table 4. 32: Article Search and Selection Process 187
Table 4. 33: Types of Journals in which the Articles Were Published (n=27) 191
Table 4. 34: Type of Research Design and Age Range of Participants 192
Table 4. 35: Joanna Briggs Institute (2014) Levels of Evidence 194
Table 4. 36: Countries where Researches were Carried Out 196
Table 4. 37: Themes and Subthemes from the Analyzed Data 197
Table 4. 38: Sub-Themes 197
Table 4. 39: Duration of Intervention 201
Table 5. 1 :Seven-Staged Mixed Methods Analysis Process 212
Table 5. 2Table of Content of the Intervention Programme 217
Table 6. 1: Plan for Implementation of the MetS Intervention Programme 224
Table 6. 2: Descriptive statistics for Age and Blood Pressure 230
Table 6. 3: Demographic Features of Participants 233
Table 6. 4: Pre and Post-Intervention Analysis of the Determinants of Mets 239
Table 6. 5: Descriptive Analysis of Participants' Age and Determinants of Metabolic Syndrome 239
Table 6. 6: Mets Determinants Pre and Post Intervention (N=70) 240
Table 6. 7: Age against Metabolic Syndrome Variables (Pre intervention, n=70) 258
Table 6. 8: Age against Metabolic Syndrome Variables (Post- Intervention, n=70) 259
Table 6. 9: BMI against Metabolic Syndrome Variables (Pre and Post Intervention) 260
Table 6. 10: MetS Status of Participants (n=70) Pre and Post Intervention 261
Table 6. 11 :Pre-Intervention Knowledge of Metabolic Syndrome Prevention 263
Table 6. 12: Age and Knowledge Score 266
Table 6. 13 :Total Knowledge Score (Frequency and Percentages, N=70) 267
Table 6. 14: Descriptive Analysis for Knowledge of MetS Score 267
Table 6. 15: Demographic Features of Participants 271
Table 6. 16: Comparison of Age, Educational Level, and Marital Status Distribution 272
Table 6. 17: Cronbach Alpha 273
Table 6. 18: Descriptive Analysis of the QOL Domains (Pre and Post-Intervention) 274
Table 6. 19: Correlational Coefficiency Description of the QOL Domains 275
Table 6. 20 : Frequency Responses (%) for Facets of the WHOQOL-BREF (n=70) 277
Table 6. 21: Frequency Responses (%) for Facets of the WHOQOL-BREF (n=70) 278
Table 6. 22: Comparison of QOL Domains, Age, Education, Marital Status, BP and BMI 279
Table 6. 23: Age, Marital Status, Educational Status and QOL Domains 280
Table 6. 24: FBS 281

Table 6. 25: HDL 282
Table 6. 26: TRIG 282
Table 6. 27: PAIRED- T TEST: Evaluation of QOL and MetS determinants 283
Table 6. 28: Analysis of Satisfaction Evaluation Questionnaire (n=70) 295
Table 6. 29: Descriptive Analysis of Results of Weekly Weight Monitoring 301

LIST OF FIGURES

Figure 1. 1: Structural Context of Kaneshie Market (citinews//Kaneshie market, 201 9
Figure 1. 2: Open Air Activities outside the market (citinews//Kaneshie market, 2014) 9
Figure 1. 3: Second and Ground Floor of the Market for Sale of Clothes and Food Stuff (citinews//Kaneshie market, 2014). 11
Figure 1. 4: Organizational Structure of the Kaneshie Market (Accra markets Limited, 2011) ...13
Figure 1. 5: The Multiphased Mixed Method Design & the Seven-Stage Mixed Methods Data Analysis (Onwuegbuzie and Teddlie, 2003) 26
Figure 2. 1: Major Concepts of the Health Promotion Model (Pender et al., 2011)……..33
Figure 2. 2: Scope of Literature Review 41
Figure 3. 1: The Multiphase mixed method design & Seven-stage mixed method data analysis (Onwuegbuzie and Teddlie, 2003)…….56
Figure 4. 1: Age Distribution of Participants……86
Figure 4. 2: Marital Status of Participants.....87
Figure 4. 3: Educational Level of participants.....88
Figure 4. 4 :Sociocultural Background 89
Figure 4. 5: Religious Affiliation of Participants 90
Figure 4. 6: Period of Trading 91
Figure 4. 7:Diabetes Diagnosis.....92
Figure 4. 8: Hypertension Diagnosis.....92
Figure 4. 9: Participants who were on Medication 93
Figure 4. 10: Total Knowledge Score of Participants.....97
Figure 4. 11: Age Range against Knowledge Score 97
Figure 4. 12: Prevalence of MetS among Participants.....104
Figure 4. 13: Waist Circumference Distribution for MetS.....105
Figure 4. 14: High Density Lipoprotein Distribution for Metabolic 105
Figure 4. 15: Triglyceride Distribution for Metabolic Syndrome 106
Figure 4. 16: Fasting Blood Sugar Distribution for Metabolic Syndrome.....107
Figure 4. 17: Blood Pressure Distribution for Metabolic Syndrome 107
Figure 4. 18:Body Mass Index Distribution for Metabolic syndrome.....108
Figure 4. 19: Total Knowledge Score for METS Positive Participants 122
Figure 4. 20: Flow Diagram of the Search and Selection Process for the Included Studies 188
Figure 4. 21: Year of publication of Articles.....192
Figure 4. 22: Duration of Intervention 202
Figure 5. 1 :The Mixed Methods Analysis Process…….214
Figure 5. 2: The Kaneshie Market Complex 216
Figure 6. 1: The METS Team and Programme of Activities for the Mets Awareness Day……231

Figure 6. 2Figure 6. 3Figure 6. 4Figure 6. 5Figure 6. 6Figure 6. 7Figure 6. 8 .. **Error! Bookmark not defined.**
Figure 6. 9: Diabetes Diagnosis 236
Figure 6. 10:Hypertension Diagnosis 237
Figure 6. 11: Participants on Medication 238
Figure 6. 12: Boxplot of Waist Circumference 241
Figure 6. 13: Scatter Plot of the Waist Circumference 242
Figure 6. 14: Boxplot of HDL 244
Figure 6. 15: Scatter Plot of the HDL 245
Figure 6. 16:Boxplot of TGL 246
Figure 6. 17: Scatter Plot of the Triglyceride 247
Figure 6. 18: Boxplot of Fasting blood sugar (FBS) 249
Figure 6. 19: Scatter Plot of the Fasting Blood Sugar 250
Figure 6. 20: Boxplot of Systolic Blood Pressure 251
Figure 6. 21: Scatter Plot of the Systolic Blood Pressure 252
Figure 6. 22: Boxplot of Diastolic Blood Pressure 253
Figure 6. 23: 23 Scatter Plot of Diastolic Blood Pressure 254
Figure 6. 24: Boxplot of BMI 255
Figure 6. 25: Scatter Plot of the BMI 256
Figure 6. 26: Boxplot of Knowledge of MetS 268
Figure 6. 27: Scatter Plot of the Knowledge 269
Figure 6. 28: Boxplot of Physical Health 284
Figure 6. 29: Scatter Plot of the Physical Health 285
Figure 6. 30: Boxplot of Psychological Health 286
Figure 6. 31: Scatter Plot of the Psychological Health 287
Figure 6. 32: Boxplot of Social Relationship 288
Figure 6. 33 :Scatter Plot of the Social Responsibility 289
Figure 6. 34: Boxplot of Environmental Health 290
Figure 6. 35 :Scatter Plot of the Environmental Health 291

LIST OF ABBREVIATIONS

AACE:	American Association of Clinical Endocrinologists
AHA:	American Heart association
ATP:	Adult Treatment Panel
B/P:	Blood Pressure
BMI:	Body Mass Index
CDC:	Center for Disease Control
CVA	Cerebrovascular Accident-
CVD:	Cardiovascular Diseases
DEP:	Diet Exercise Programme
EGIR:	European Group for the Study of Insulin Resistance
EQ-VAS:	EuroQoL Visual Analog Scale
FBS:	Fasting Blood Sugar
FGD:	Focus Group Discussion
GSPED:	Ghana Association of Pediatric Endocrinology and Diabetes
HAES:	Health at Every Size
HDL:	High Density Lipoprotein
HPL:	Health Promotion Lifestyle
HPLP:	Health Promotion Lifestyle Profile
HPM:	Health Promotion Model
HRQoL:	Health Related Quality Life
HCPs:	Home Care Providers
IDF:	International Diabetes Federation
JNC:	Joint National Committee
KAP:	Knowledge Attitude and Practices
K-MS:	Knowledge of Metabolic Syndrome
LDL:	Low Density Lipoprotein
MetS:	Metabolic Syndrome
MSKS:	Metabolic Syndrome Knowledge Scale
NCD:	Non-Communicable Diseases

NCEP:	National Cholesterol Education Programme
NGO:	Non-Governmental Organization
NHLBI:	National Heart, Lung and Blood Institute
PSQI:	Pittsburg Sleep Quality Index
QOL:	Quality of Life
SD:	Sexual Dysfunction
SFs 36:	Short Form Survey 36
T2D:	Type 2 Diabetes
TG/TGL:	Triglyceride
WBVE:	Whole Body Vibration Exercise
WC:	Waist Circumference
WHO:	World Health Organization
WWPP:	Weight Watchers Point Plus

CHAPTER ONE

ORIENTATION TO THE STUDY

1.1 BACKGROUND AND RATIONALE

Metabolic syndrome (MetS), a condition which is often called cardiometabolic disease is commonly described as consisting of a cluster of four risk factors which may result in cerebrovascular accident (CVA) and cardiovascular diseases. The four risk factors include: firstly, the elevated visceral obesity, which is described as the deposition of excess body fat. There is a resulting weight gain and increase in waist circumference. Glucose intolerance or dysglycemia the second risk factor, relates to high blood glucose which is commonly associated with insulin resistance. Dyslipidemia being the third predisposing factor is described as having increased levels of triglyceride in the blood and low high-density lipoprotein cholesterol. The last risk factor is hypertension or high blood pressure (Kaur, 2014).

Kaur (2014) stated that some scientists describe MetS as consisting of five risk factors. The five risk factors are characterized by high blood pressure, waist circumference, fasting blood sugar level, and triglycerides with low high-density lipoprotein''. Kaur (2014) further noted that MetS results from physiological predisposing factors including high blood pressure, high cholesterol, central obesity and glucose intolerance, which shows an underlying insulin resistance.

According to Kassi et al. (2011), metabolic syndrome (Mets) is regarded as a global epidemic which leads to increased socioeconomic burden. Although 'metabolic syndrome' dates to over five (5) decades, in recent times, much attention has been drawn to the concept. This may be attributed to its interconnectedness with cardiovascular morbidity and mortality. Okafor (2012) also averred that MetS has been given different definitions by different scientists and these experts have also used various criteria for describing the syndrome.

The National Cholesterol Education Programme (NCEP), Adult Treatment Panel III (ATP III) in defining MetS, focused on insulin resistance (NCEP, 2001). The American

Association of Clinical Endocrinologists (AACE) in 2003, revised the NCEP ATP III criterion to put into focus again, insulin resistance as a fundamental metabolic risk factor. Amidst these different explanations for MetS, the International Diabetic Federation (IDF) in 2005 provided a clinical algorithm for MetS which attempted to merge the different diagnostic criteria and therefore came up with a consensus worldwide definition of the Syndrome (Gyakobo et al, 2012). These bodies collaboratively defined MetS through embracing the fact that MetS is characterized by abnormal changes in glucose metabolism, obesity, hypertension, and dyslipidemia (Kaur, 2014).

In line with the definitions given by other organizations, the IDF (2006) used the following criteria for diagnosing metabolic syndrome: Central obesity and a minimum of two of the under mentioned four elements namely: Low levels of HDL cholesterol in the blood, High blood glucose, increase in triglycerides levels in the blood and increased blood pressure. These criteria are widely used for diagnosing MetS in recent times. Similarly, Goff et al. (2014), postulated that the main presentation of MetS is hypertension, described as systolic blood pressure higher than 140mmHg or diastolic blood pressure higher than 90mmHg during resting. Similarly, Alberti et al (2009) also averred that upper body and central obesity are major contributors to the development of hypertension, hyperglycemia and hyperlipidemia. Goff et al (2014), Alberti et al (2009) and Kaur (2014) further stated that MetS often has a linkage with genetic factors and visceral obesity.

Historically, metabolic syndrome has its origins in the 1920s. A Swedish physician by name Kylin, showed the association of the syndrome with hypertension, hyperglycemia, and gout (Kaur, 2014). Kylin (1923), cited by Sarafidis and Nilsson (2006), first discovered a cluster of metabolic disturbances in the human race. In 1947, another scientist known as Vague also noted the linkage of MetS with android obesity (Okafor, 2012). In 1965, Avogaro and Crepaldi, also described MetS as comprising of hypertension, hyperglycemia, and obesity (Kaur, 2014).

The process of defining metabolic syndrome has advanced remarkably. In 1988, Raven, during a Banting lecture, described MetS as a cluster of possible factors for diabetes and cardiovascular diseases and called it syndrome X. A year later, a new definition was

postulated by Kaplan (1989) who called the syndrome ‘’the deadly Quartet’’. Kaplan’s (1989) definition in addition to existing knowledge included ‘Upper body obesity’ plus the combination of ‘’glucose intolerance, hyperglyceridemia, and hypertension’’. However, in 1992, the syndrome was again renamed “The insulin Resistance Syndrome’’ (Kaur, 2014).

According to Kaur (2014), metabolic syndrome has been given a lot of synonymous names by several authors. Notable among these are Reaven’s Syndrome, Syndrome X, Insulin Resistance Syndrome, as well as Deadly Quartet and Hypertriglyceridemic Waist. Gyakobo et al (2012) further posited that several authors including the WHO and IDF, also proposed a criterion for MetS diagnosis. In conclusion, Mozumdar & Liguori (2011) stated that, there has been an increased interest in metabolic syndrome (MetS), its relation with type 2 diabetes and cardiovascular diseases especially in the developed world. Hence a lot of researches are being conducted on Mets and its associated complications in recent times.

Arthur et al., (2013) asserted that MetS makes individuals vulnerable to the development of CVA, type 2 diabetes, coronary artery and cardiovascular diseases. Kaur (2014) in similar vein, also stated that MetS is considered to be an epidemic which makes individuals prone to cardiovascular disease and sudden death. Subjects with MetS are more prone to having a heart attack or stroke, and type 2 diabetes. Similarly, Kassi et al (2011) revealed that individuals with MetS are more susceptible to dying from cerebrovascular accident (CVA).

1.1.1 Prevalence of MetS

In relation to MetS, prevalence connotes the number of cases or the proportions of persons who have MetS in a population at a given time (National Institute of Mental Health, 2017). According to Mozumdar & Liguori (2011), there is no clear trend showing the pattern of metabolic syndrome worldwide. However, Kassi et al., (2011) estimated that globally, about (20–25) % of the population have MetS.

In the context of this study, prevalence is discussed in relation to the components of MetS, population, age and gender affected by MetS.

- **Components of MetS**

The prevalence of MetS differs with reference to the number of MetS predictors that a person has (Mozumdar & Liguori, 2011). According to Saklayen (2018), MetS prevalence varies, in relation to the criteria used for defining MetS. A survey conducted in Iran by Ostovar et al., (2017) estimated MetS prevalence with ATP II criteria to be 34.7%; IDF as 37.4% and ATP III/AHA/NHLBI was 41.6%. In this study the IDF criteria was used for diagnosing market women with MetS.

Similarly, Okafor (2012) also revealed that, globally, MetS is common among the populace with an estimated value of 17 to 25%. Okafor (2012) further stated that, the higher MetS prevalence rates are usually observed among patients with diabetes. This implies that diabetes predisposes individuals to the development of MetS.

- **Population**

The prevalence of MetS differs in other populations. However, it is said to be high in developed countries as a result of high intake of 'junk' food and poor exercise regimes which leads to increased rates of obesity (Okafor, 2012). Similar to this assertion, Saklayen (2018) revealed that, the number of MetS clients is usually high among urban population of some developing countries than among the Western fellows. The high prevalence of Mets is often ascribed to two main causes which are: increased intake of high calorie-low fiber fast food and physical inactivity as a result of sedentary lifestyle (Saklayen, 2018).

Gyakobo et al., (2012) stated that increased prevalence rates above 40% has been reported in countries such as Portugal, Mexico, Urban China, and United Arab Emirates. India and Brazil recorded rates above 40% by the NCEP ATP III criterion. On the contrary however, rates below 10% per the NCEP ATP III and IDF criteria have been reported in Spain, Japan and Hong Kong.

Okafor (2012) again revealed that in the past, MetS prevalence rate was low in Africa. However, MetS is now becoming common in Africa and a public health concern in recent times. The prevalence of MetS in Africa according to Okafor (2012) ranges from 0% to about 50% or higher and this depends on the population setting. This is similar to that of

developed nations. The increased prevalence of MetS in developing countries is often associated to the adoption of Western lifestyle.

- **Prevalence of MetS among age groups**

Okafor (2012) stated that MetS is associated with ageing. In the USA, the prevalence of MetS is twofold prevalent among individuals between 40 and 59 years old compared with those between 20 and 39 years (Mozumdar & Liguori, 2011). According to Okafor (2012), in Africa, MetS was initially found to be common among adults but it was discovered that, the prevalence of MetS was increasing among the young population.

- **Gender and MetS**

Various studies have revealed high prevalence rates of MetS amongst males and females. Similarly, US and Iran suggest gender differences in the prevalence of MetS amongst males and females bringing to bear the gender sensitivity of both algorithms (Gyakobo et al., 2012). The prevalence of MetS in US was approximately 50% for both males and females from age 60 and above (Mozumdar & Liguori, 2011).

Gyakobo et al., (2012) indicated that studies conducted in rural Nigeria revealed a prevalence rate of 12.1% per the NCEP ATP III criterion and observed similar prevalence rate amongst males and females. Obesity and abnormalities in blood cholesterol were seen to be the most common MetS predictors. Okafor (2012) stated that obesity seems to be very rampant in females, whiles high blood pressure is also very rampant in males. The predominant underlying cause was attributed to Insulin resistance. However, according to Mandob, Samuel, and Viviane (2015), the prevalence of MetS is measured to be 7 to 56 % among women worldwide. Saklayen (2018) also found out that in Middle Eastern countries, prevalence of MetS was very high among females than males.

Arthur et al. (2013) in another study said that there is a higher incidence of MetS among Ghanaian women. This was attributed to the adaptation of the “western” lifestyle as well as the possibility of weight gain after giving birth.

1.1.2 Lifestyle and MetS

Although the etiology of MetS is not well stated, it is most likely linked to decreased physical activity and diet (Kaur, 2014). World Health Organization (2014) estimated that about three quarter of deaths occur as a result of non-communicable disease (NCD), however poor eating habits and physical inactivity have proven to be the leading causes of non-communicable diseases. WHO (2014) further stipulates that smoking and alcohol intake have also contributed to the development of some key metabolic changes such as high blood pressure, hyperglycemia, hyperlipidemia and overweight or obesity.

According to Kim et al., (2016), developed countries are most likely to suffer from MetS. Likewise, sedentary workers, smokers, people with low socioeconomic status and individuals with unhealthy dietary habits are also prone to MetS. Furthermore, research has shown that, in the past 30 years, there has been an increased incidence of obesity and physical inactivity among people in developed countries resulting in metabolic and cardiovascular dysfunctions, such as type 2 diabetes and MetS. Physical inactivity and sedentary lifestyle are said to be the main predisposing factors for MetS to occur as well as its complications (Szostak & Laurant, 2011).

Lack of physical activity leads to the gathering of visceral fat which promotes development of pathological disorders such as insulin resistance and atherosclerosis, thereby leading to the development of a cluster of diseases referred to as the 'diseasome of physical inactivity', which include MetS (Szostak & Laurant, 2011). A recent CDC data showed that 40.8 % of the adults in USA were physically inactive (Saklayen, 2018). According to Saklayen (2018), it was presumed that with the acceptance of Western lifestyle, high usage of automobiles and a lot of time spent watching TV at home, the data trend of MetS will be the same for developed countries, though there are no easy access to physical activity data in developing countries. In conclusion, high sedentary lifestyle is considered a main contributory factor for high prevalence of MetS (Saklayen, 2018).

Kaur (2014) further asserted that, recent food eaten globally, contributed to the building up of MetS. Dietary carbohydrate, protein and fat are sources of energy but potentiates MetS if physical activity is not consistent with energy requirement. This competing demand for

energy and its utilisation generates a stockpile of mitochondrial oxidation end products. According to Kaur (2014), the process is linked with progressive mitochondrial dysfunction and insulin resistance, leading to metabolic syndrome. Thus; there is decreased HDL levels, inefficient lipid metabolism, decreased HDL2 production and reduced fibrinolytic activity which result in increasing risk of clot formation and coronary artery diseases.

VanWormer et al (2017) revealed that lifestyles such as smoking and alcohol use increases an individual's risk for MetS. Slagter et al., (2013) also found out that smoking increases an individual's risk for MetS by 26% because nicotine found in most cigarettes' triggers hormonal and neurotransmitter activities which leads to the release and breakdown of fatty acids and for that matter, smokers tend to have a lot of fat built up around their abdomen. Similarly, according to Slagter et al., (2013), alcohol consumption increases MetS risk. Although the risk for MetS is lower for moderate consumption of alcohol, in the case of hard liquor the risk for MetS is very high.

1.1.3 Knowledge of MetS

Although MetS is considered a worldwide epidemic, Lewis et al (2008) in Gyakobo et al (2012) posited that there is lack of knowledge about the syndrome especially in Africa. The researchers further asserted that this lack of knowledge about MetS could make individuals liable to the development of MetS. Similarly, among the Chinese adult in the community setting, Lo, et al., (2016) observed that acquiring knowledge of MetS is important and will help prevent diseases such as type 2 diabetes and cardiovascular diseases from developing. This was based on their study that majority of the participants exhibited poor understanding of MetS. Mandob et al (2015) further stated that there is lack of knowledge about MetS, especially in Africa.

1.1.4 Prevention of MetS

The U.S Department of Health and Human Services (2009), states that, MetS is a complex phenomenon that needs a vast range of techniques to curb it. Dunkley et al. (2012) revealed that lifestyle modification is the most accurate method to reduce one's chances of having

MetS. Consequently, another study revealed that programmes involving diet and exercise in metabolic adults have a positive effect on health promotion lifestyle (Lin & Chu, 2014).

Accordingly, Arthur et al., (2013) also posited that engaging in physical activity, taking in diets low in calories and reduced intake of alcoholic beverages have shown to reduce the prevalence of MetS in women. Similarly, according to WHO (2013), some literature had considered diet and exercise to be the most effective way of preventing metabolic syndrome (WHO, 2013). Saklayen (2018) also asserted that, the epidemic of MetS did not happen suddenly and it cannot be controlled quickly, but with societal will and effort, it can be achieved. As other epidemics can be controlled, educating the population about the health hazard of the MetS is very important in reducing the incidence of MetS.

In line with the assertion by the other researchers, Grandner et al (2012) stated that health care professionals are more competent to improve health outcomes by building on the strengths of individuals and communities. Individuals can be empowered through health promotion activities such as creation of awareness through health education.

1.2 THE KANESHIE MARKET COMPLEX

The Kaneshie market is one of the ten big and renowned market places located in the Greater Accra Region of Ghana. Open-air markets are very common in Ghana. Some of these markets operate every day, others regularly. The Kaneshie Market unlike other markets in Ghana is an enclosed three-storey building. There is an estimate of 1069 stalls on the ground floor, 534 on the first floor, and 696 on the second floor with some of the stalls occupied by more than one trader.

However, open air trading activities also go on outside the market. The area is also a hub for ‘tro-tros’ (shuttles) and buses. There is a lorry station, and a car park at the open space outside the market.



Figure 1. 1: Structural Context of Kaneshie Market (citinews//Kaneshie market, 201



Figure 1. 2: Open Air Activities outside the market (citinews//Kaneshie market, 2014)

The name ‘Kaneshie’ means ‘under the lamp’ in Ga, one of the languages in Ghana referring to its beginnings as a night market. The Kaneshie market complex was established over 40 years ago, funded by the government of Ghana and other non-governmental organization to replace the existing open air and sprawling single-storey. The Market was hailed as a pleasing innovation and it is still an impressive structure.

Currently, the market has an estimated population of about 6,000. Female traders (n=4032) constitute the greatest share engaged in trading at the market. This is because women are predominantly involved in trading activities in Ghana. The ground floor is purposely designed for food and agricultural products, the first floor is for items such as provisions, utensils and rubber products. The second floor is devoted to clothing and other materials. The market receives about 10000 customers and commuters daily. In addition to this, the market is also divided into groups according to likeness of activities. All fish sellers belong to one group headed by a queen. Same can be said of those selling different kinds of products, the various drivers‟ unions among others. The various group heads help with the organization of their members and also seek members’ welfare by informing management about their needs, suggestions and grievances.

There is a clinic at the Kaneshie market, run on out-patient basis, and it also has three financial banks and other microfinance institutions. The market also has an enclosed private place where meetings are held and health-related activities such as health screening and immunization programs are organized. A wide array of products are sold in the market and its surrounding streets. Kaneshie market is usually characterized by informal economy with majority of the activities unregulated and also not requiring any qualification. In addition, there are unofficial trading activities outside the market. Traders involved in these activities are squatters and hawkers with no permanent stalls or stall numbers who come to sell on daily basis or occasionally.



Figure 1. 3: Second and Ground Floor of the Market for Sale of Clothes and Food Stuff (citinews//Kaneshie market, 2014).

1.2.1 Organizational Structure of the Kaneshie Market

The market has an administrative office which is run by the management team of the Accra Markets Limited. The vision of the market is ‘’to strive to be a pace-setter in the sale of quality goods and provision of excellent services thereby attracting large patronage’’.

In terms of organization, the Board of Directors oversee the setting of policies and guidelines for effective running of the market through the Managing Director and his assistant, heads of functional departments and various supervisors (Refer figure 1.4).

In addition to this administrative structure, is the wing of groups of market women (grouped according to the type of goods sold). Each group is headed by a leader and all these group leaders and market women also report to the market queen, her deputy and secretary who see to the welfare of the market women and ensure law and order in the market, as well as the smooth running of the activities of the market. The market queen and her team also report directly to the administrative and human resource directors. The team has a task force that go around to ensure people do not trade illegally at the market.

Tickets are also given daily to squatters and hawkers who are not permanent traders at the market, but occasionally come to sell in the market. On a monthly basis, the Ministry of Local Government, Accra Metropolitan Assembly in conjunction with the market administration and the queen organize a clean-up exercise to tidy up the market.

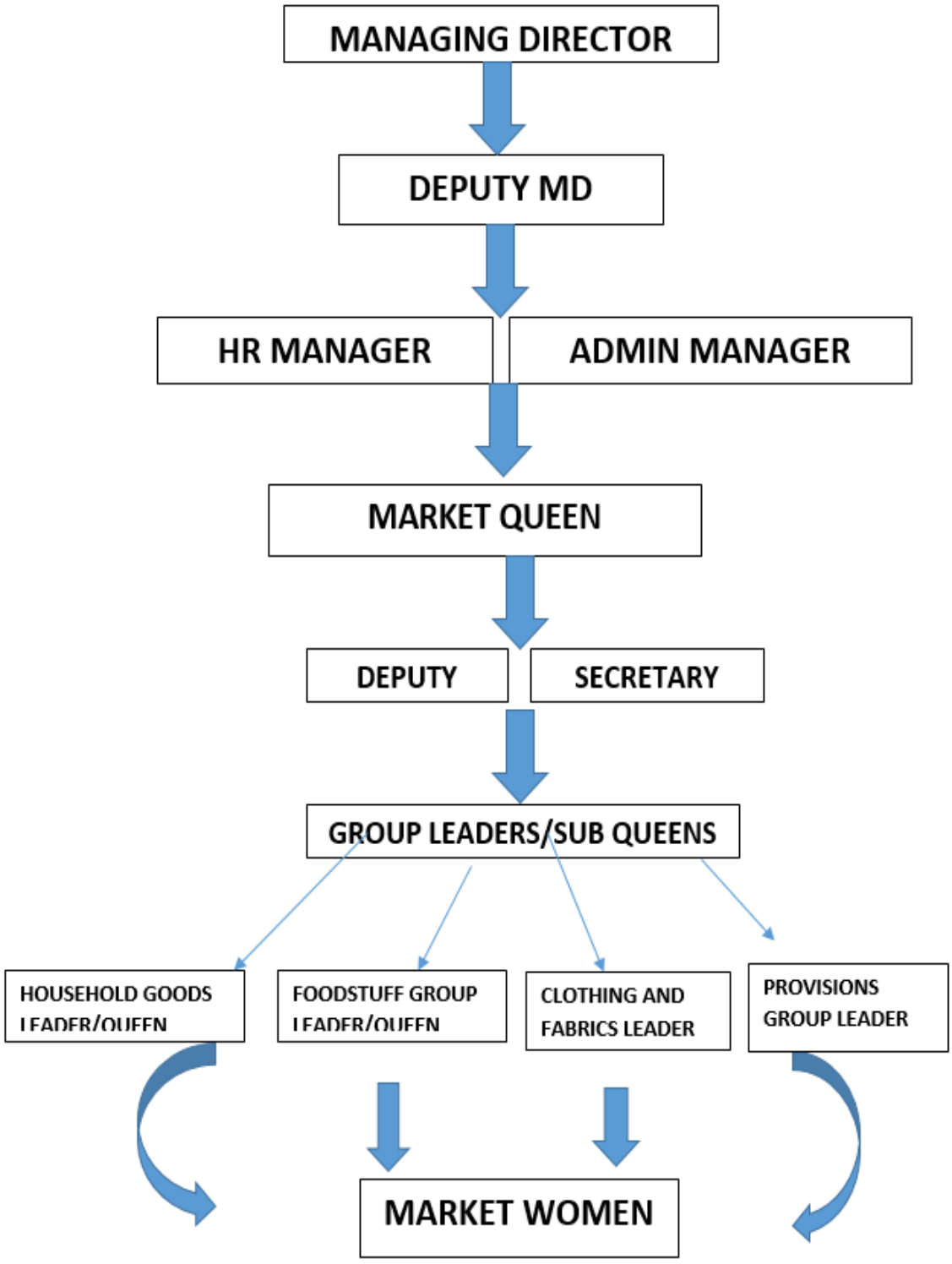


Figure 1. 4: Organizational Structure of the Kaneshie Market (Accra markets Limited, 2011)

1.3. PROBLEM STATEMENT

MetS is characterized by risk factors that makes an individual prone to CVDs, type 2 diabetes, stroke, and coronary artery disease (Arthur et al., 2013). According to the International Diabetes Federation (IDF) (IDF, 2006) about 25% of the adult population worldwide have MetS.

In Ghana, Arthur et al., (2013) discovered an increase in MetS among Ghanaian women. Other studies also reveal an increase in the prevalence of MetS among women globally (Mandob et al., 2015).

Grandner et al., (2012) averred that intervention or wellness programmes can be developed for individuals to improve their health outcomes and can play a vital role in addressing and managing metabolic disorders and non-communicable diseases. The researcher as a health professional, has observed that the Kaneshie market is one of the busiest markets in Ghana, with diverse trading activities. People working in the market are predominantly women. The women trading at the market become so engrossed in their daily trading activities. The researcher on observation and encounter with the market women during her weekly shopping realized that these women are in the market as early as 6am and they close very late. As soon as they arrive, they arrange their wares and sit behind their goods. This is their life; all day long they bargain, argue, converse and compete for customers.

Women trading in the market have diverse ethical and educational background and are mostly adults with age group predominantly ranging between ages 25 and 65. Some of these women are plump, and others are also slender. These market women are physically inactive due to prolonged sitting. They have little or no time for exercising and tend to also buy and eat any available food being sold on the market, some of which may be unhealthy. They have no time to cook by themselves due to preoccupation with trading activities and the market is also not convenient for cooking as a result of congestion. Market work related factors including physical inactivity and poor nutrition due to preoccupation with trading activities, as well as lack of knowledge regarding the effect of this kind of work environment coupled with the high carbohydrate consumption in Ghana, could predispose market women to the risk of MetS. Thus, these market women are prone to the development

of MetS. It is in this context that the researcher developed an interest in developing an intervention for women with metabolic syndrome at the Kaneshie market in Accra, Ghana.

Gyakobo et al., (2012) revealed that although multiple studies have been conducted on metabolic syndrome globally, studies on MetS in sub-Saharan Africa were scanty. According to Lo et al., (2015), MetS could be prevented through lifestyle changes. These changes in lifestyle could be facilitated through activities which are aimed at helping individuals to change perceptions of their own health which will result in improved health outcomes. Similarly, Joshi et al., (2013) stated that patient's knowledge, attitudes, and behavior play an important role in the prevention of metabolic syndrome and the risk factors linked to it. However, there is limited public awareness on this concept especially in the developing world.

A literature search revealed that many researchers have developed interventions for adults with MetS. However, there is no evidence of a community-based health promotion programme conducted for improving health outcomes among market women in Ghana. The Research question therefore is: would a metabolic syndrome wellness programme focusing on health promotion promote health and improve health outcomes of women identified to have metabolic syndrome (central obesity plus any two of the other MetS predictors) per the IDF(2016) criteria, as well as those at risk of MetS at a market place in Ghana?

1.4 RESEARCH PURPOSE

The purpose of the study was to develop and pilot test a metabolic syndrome intervention programme targeted at enhancing the health and quality of life of market women in Accra, Ghana.

1.5 OBJECTIVES OF THE STUDY

To accomplish the above purpose, the study was conducted in three phases in line with the underlisted objectives:

Phase 1: Situational Analysis Phase

- To describe the knowledge of metabolic syndrome among market women in Accra, Ghana.
- To explore the prevalence of metabolic syndrome among market women in Kaneshie.
- To establish the correlation among demographics, MetS predictors and knowledge of Mets
- To describe the quality of life of the market women who have been identified to have metabolic syndrome.
- To establish the correlation among MetS predictors and QOL domains
- To explore the opinions of the market women regarding the measures that could be implemented to promote health in women identified to have metabolic syndrome.
- To explore documented intervention or health promotion programmes for promoting health in metabolic syndrome.

Phase 2: Development and Expert Review Phase

- To develop a Mets intervention programme for market women in Accra, Ghana identified to be at risk or have metabolic syndrome.
- To conduct an expert review of the intervention program

Phase 3: Pilot (Implementation) and Evaluation Phase

- To pilot test and evaluate the outcomes of the intervention program.

1.6. SIGNIFICANCE OF THE STUDY

An intervention study is aimed at helping to improve the condition of individuals, or a group of people, and also evaluate the impact of a programme (Thiese, 2014). The development of a metabolic syndrome intervention programme could contribute towards empowering women with knowledge as well as promoting health and enhancing quality of life of market women with metabolic syndrome as well as those that are at risk of

developing the syndrome in Ghana. It is also hoped that the proposed study will add to the existing body of knowledge on metabolic syndrome.

1.7 THEORETICAL FOUNDATIONS OF THE STUDY

Research is guided by a central theory statement, which is an anticipated outcome of the study.

1.7.1 Central Theoretical Statement

The development of a metabolic syndrome intervention programme focusing on health promotion could be instrumental in promoting health related quality of life of market women with metabolic syndrome in Ghana. Research is guided by sets of beliefs and practices adopted by researchers in studying a particular phenomenon (Weaver & Olson, 2006). Researchers base their assumptions on paradigmatic perspectives. The various paradigms are characterized by methodological differences in their approaches to conducting research. Based on this knowledge, the researcher identified and adopted Pender (1996)'s Health Promotion Model for exploring the phenomenon which was studied. The model is described in-depth in chapter two.

Pender (1996)'s Health Promotion Model (HPM) is significant because it has been found to be very relevant in settings such as homes and health centers and applicable in researches on smoke cessation, weight management and exercise (Peterson & Bredow, 2009). It affects health, person, environment and nursing hence relevant and applicable to this study.

1.7.2 Meta-Theoretical Assumptions

Burns, Groove and Gray (2013) mentioned that meta-theories are devised to analyze theoretical systems. They are also said to be ''formal systems that describe the structure of some other systems''.

The driving metaparadigms of health, person, environment and nursing are key conceptual frameworks that influence nursing decisions and interaction (Chinn & Kramer, 2011). The expectation is that individuals, families and communities will gravitate towards a wellness continuum as part of the health-person-environment-nurse interactions. Pender, Murdaugh, and Parsons (2011) argue that there is an interdependence between individual health and

the health of society. Balancing the relationship between the concepts of illness-wellness is enhanced through health promotion intervention that targets the individual and society which contribute to improving quality of life.

The researcher's development and pilot testing of a MetS intervention programme focusing on health promotion could be instrumental in promoting health and quality of life of women identified to have MetS in Ghana. This is embedded in the following assumptions:

- **Person/Community**

Pender (1996)'s health promotion model is a holistic perspective of the persons/individuals interacting with their environment as the whole rather than the individual elements. The model further states that individual characteristics and life experiences shape behaviors (Pender et al., 2011). In Pender this is about Biological, Physiological and Sociocultural factors influencing the person's health behaviors and practices.

In this study, persons were described as a group of market women with permanent stalls at the Kaneshie market. They comprise females who sell in an open or enclosed space where trading and other activities take place. The market women in this community are dynamic biopsychosocial beings in constant interaction with each other with diverse ethical and educational background. Market work related factors such as poor physical activity and lack of proper nutrition due to preoccupation with trading activities. There is also lack of knowledge regarding the effect of work environment on the health of the market women as well as the risk of MetS.

- **Environment**

In general terms, 'environment' refers to the surroundings or conditions in which a person lives or operates. Environment also refers to the internal factors affecting an individual (Webster's Dictionary, 2011). Pender et al., (2011) further stated that a ''person is a biophysical organism influenced by the environment. In this study, the environment is the Kaneshie market complex, the space within the market where the women carry out their trading activities and interact with each other. The market environment according to the market women has an influence on their health. The women stated that the type of food

sold in the market as well as the nature of their work greatly influenced their lifestyle and health.

- **Health**

Pender (1996)'s explanation of health serves as the basis for her entire model. Pender (1996) argues that there is a behaviour orientation within individuals which motivates self-competence and satisfaction to achieve, adjust and build relationship. In adjusting, structural integrity and harmony needs to be maintained within the environment. Pender (1996) further stated that, Health promotion is a means of supporting individuals, families, and communities to be in control of their own health through positive behavioral adjustment. The goal of nursing is to safeguard the health and wellbeing of individuals, families and society at large.

WHO (1948) refers to health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity? In this study, the health of the market women was viewed in relation to their metabolic syndrome status and their quality of life which entails their physical, psychological and social well-being

- **Nursing**

According to the American Nursing Association's Social Policy Statement (2003), "Nursing is the protection, promotion, and optimization of health and abilities through the diagnosis and treatment of human response, and advocacy in the care of individuals, families, communities and populations". According to Pender (1996), ''nurses play a role in collaborating with patients, families, and communities to enhance the attainment of optimal health and high-level well-being''. In the context of this study, nursing entails education of the market women on metabolic syndrome and healthy living as well as the development of a wellness program aimed at reducing the incidence of MetS among women and improving their quality of life.

1.7.3 Theoretical Assumptions

These are propositions made by researchers in relation to a phenomenon under study or being researched (Polit & Beck, 2012). The main purpose of this research is the development of a metabolic syndrome intervention programme to ameliorate the health and quality of life of the market women with MetS as well as those at risk of the syndrome.

Pender (1996)'s conceptual model was used because the model can be used as a basic structure for nursing protocols and interventions.

Pender (1996) developed the Health Promotion model which is often abbreviated as HPM, based on the perception that quality of life of the patient can be ameliorated by avoiding problems before they happened. After researching recent models and noticing most focused on negative motivation, a model was developed to focus on positive motivation, which this research seeks to achieve.

According to the HPM, interrelated personal factors comprising biologic, psychologic, and sociocultural as well as age, body mass index, pubertal staging, menopausal staging, aerobic capacity, strength, agility, or balance can impact individuals' propositions to change. (Pender, et al., 2011). In this study, the demographic characteristics, religious and sociocultural background were assessed, as well as other characteristics such as knowledge and prevalence of MetS in designing a wellness programme for the market women.

1.7.4 Definition of concepts

- **Metabolic Syndrome**– According to Grundy et al., (2004), MetS is a combination of risk factors that predisposes individuals to diabetes, stroke, heart disease and other health problems. The International Diabetes Federation (2006) and the NCEP ATP III are used below to give a detailed description of the MetS.
  - **The International Diabetes Federation (2006)** cited in Alberti et al., (2009) used the following criteria to diagnose MetS.
    - Central obesity (waist circumference >40 inches in men, and 35 inches in Women) plus any two of the following four factors:
    - High blood glucose (sugar) ≥ 5.6 mmol/L
    - Low levels of HDL (good) cholesterol in the blood: < 1.03 mmol/L in males and < 1.29 mmol/L in females
    - High levels of triglycerides in the blood ≥ 1.7 mmol/L
    - High blood pressure which comprises a systolic BP ≥ 130 or diastolic BP ≥ 85mm Hg.

- **The NCEP ATP III** (Gyakobo et al., 2012) also used the following criteria: Any three of the following factors:
  - Waist circumference > 40 inches in men, and 35 inches in women
  - High blood glucose (sugar) ≥ 5.6 mmol/L
  - Low levels of HDL ("good") cholesterol in the blood: < 40 mg/dL in males and < 50Mg/dL in females
  - High levels of triglycerides in the blood ≥ 1.7 mmol/L
  - High blood pressure systolic BP > 130 or diastolic BP ≥ 85 mmHg.

In this study, the International diabetes Federation (IDF, 2006) criteria for diagnosing metabolic syndrome which comprises; high central obesity plus any two of the other four MetS parameters as described above, was used in identifying market women with metabolic syndrome.

Thus for the purpose of this study, metabolic syndrome means women with high waist circumference plus any two of the other MetS indicators which was diagnosed using anthropometric and physiologic measurements.

- **Risk for Metabolic Syndrome -** The following categories of people according to Health line (2017), are at risk for MetS; individuals having any one of the MetS indicators or individuals with any of the following conditions ; obesity, diabetes, hypertension, insulin resistance, renal diseases and polycystic ovarian syndrome.. In this study, women with any one of the above conditions or women with high waist circumference and one of the MetS risk factors, were classified as the at-risk group.

- **Negative for Metabolic Syndrome -** In this study, women who had normal waist circumference without any of the MetS indicators were classified as being negative for metabolic syndrome.

- **Market Women**– In this study, refers to adult females who sell in an open or enclosed space where trading and other activities take place.
- **Interventions** –These are implemented change techniques which can be simple or complex (Fraser & Galinsky, 2010). In the context of nursing these are actual

treatments and actions that are performed to help individuals and their families reach goals that have been set for them (Bulechek et al., 2012).

In this study, intervention involved a Mets wellness programme comprising exercise and diet programme designed for improving the health outcome and quality of life of market women.

- **Health Outcome**- refers to the change in health status of a person, group or population after being exposed to an intervention intended to improve health status (Health Care Costing for Value institute, 2016).
- **Wellness**- a state of mental, spiritual well-being and environmental well-being (National wellness institute, 2015). In this study, wellness pertains to a state of being in good health as an actively pursued goal.
- **Quality of life**- refers to an individual's general sense of wellbeing or satisfaction with the attributes of life. With this study, quality of life is the overall assessment of a person's well-being which comprises of physical, mental environmental dimension, stress level, and self-perceived health status (The MediLexicon Medical Dictionary, 2011).
- **Health Promotion** -refers to ''the process of allowing people to increase control over and to improve their health'' (WHO, 1986) as cited by Kickbusch (2003). In this research, health promotion refers to a programme of metabolic syndrome awareness health talks, nutrition and physical activity which could improve the health outcomes and quality of life of market women with metabolic syndrome.
- **Obesity** -is an abnormal collection of body fat, representing about 20% or above, divided by an individual's ideal body weight. (WHO, 2016). World Health Organization (WHO) and the National Institute of Health (NIH) as cited by Nguyen & ElSerag, 2010) refers overweight to BMI which ranges from 25.0 to 29.9kg/m^2 and obesity as a BMI above 30.0kg/m^2.
- **Waist Circumference Measurement** - it is done to determine the extent of body fat around the middle part of the body. According to the International Diabetes Federation, central / abdominal obesity refers to a large waist circumference or "apple-shaped" body (IDF, 2006). Normal waist circumference for men – 40inches and women – 35inches (Alberti et al.,2006).

- **Central Obesity**- it is the collection of fat in the lower torso around the abdominal area (Grandner et al., 2012).

  In this study women whose waist circumference were above 35 inches, were classified as having a high waist circumference.

- **Body Mass Index (BMI)** - refers to weight in kilograms divided by the square of height in meters (Garrow & Webster, 1985). The normal range for BMI is 18.5 to <25, whiles a BMI of 30.0 or higher, is considered to be within the obese category.

- **High Density Lipoprotein (HDL)** - is a type of lipoprotein that absorbs cholesterol and at the same time carries it to the liver which then flushes it from the body. HDL is also referred to as "good" cholesterol because increase levels can minimize the risk of stroke and heart disease, but low levels increase the risk of having stroke and heart disease (Health24, 2010).

  Below 1.29 mmol/dl - poor/low

  1.3-1.5mmol/dl - better /normal

  Above 1.5 mmol/dl - best

- **Triglycerides**- is a type of fat that stores excess energy from diet. Increase levels of Triglycerides in the blood are linked with atherosclerosis (Health24, 2010).

  Below 1.7mmol/dl - desirable/normal

  1.7- 2.2 mmol/dl - high

  2.2-5mmol/dl - very high

- **Blood Pressure** - refers to the force exerted by the heart against the resistance made by the arteries in order to keep the blood flowing via the body. The normal range is 110/70-140/90mmHg depending on age (Health24, 2010). However, according to the IDF's definition for metabolic syndrome, a blood pressure reading higher than or equal to 130/85 is high.

- **Fasting Blood Sugar (FBS)** – This is the blood glucose determination obtained after fasting for more than 8 hours (Smeltzer, 2010). The normal range in an adult is 4.7-6.0mmol. In this study, women who had FBS of above 5.5mmol/L were considered to have a high FBS, with reference to the IDF's definition for MetS.

1.8 METHODOLOGICAL ASSUMPTIONS

This refers to the presumptions that the researcher makes regarding the methodological approaches used in any research process (Creswell, 2003). The researcher believes that metabolic syndrome is a complex health problem that requires investigation into people's knowledge and perception about the concept, as well as their quality of life and opinions about measures that could promote health.

Based on the above assumptions, the researcher envisaged that qualitative and quantitative enquiry would be appropriate for the study. Hence the multiphase mixed method intervention design was adopted in conducting this study. The multiphase mixed method also supports the development, adaptation and evaluation of specific programmes. This approach was therefore deemed very necessary because the main purpose of the study is to develop, as well as to pilot test the metabolic syndrome intervention programme for women with signs suggestive of metabolic syndrome.

1.9 OVERVIEW OF THE RESEARCH DESIGN AND METHODS

1.9.1 Research Setting

The study was conducted at the Kaneshie market, in Accra which is one of the ten biggest and renowned markets, situated in the Western part of the capital of Ghana.

1.9.2 Research Design

Polit and Beck (2018), defined research design as a complete plan for tackling research objectives, which includes the strategies for enhancing the research integrity. For the purpose of this study to be achieved, a multiphase mixed method intervention design was adopted. In this study, sequential collection of quantitative, qualitative and a combination of concurrent data was implemented to achieve the purpose of developing a MetS intervention programme (Creswell and Plano-Clarke, 2011).

MetS intervention programme. Creswell and Plano-Clarke's four (4) criteria for describing mixing (interaction, priority, timing and mixing) was used in terms of describing the implementation of the multiphase mixed method design which is described in-depth in Chapter three).

1.9.3 Methods of Data collection and Analysis

To achieve the purpose of developing an intervention for the market women with MetS, the study was conducted in three phases made up of ten objectives.

Phase 1: Situational Analysis Phase

O**bjectives 1 and 2:** Two quantitative surveys aimed at describing the knowledge of metabolic syndrome as well as anthropometric measurements to explore the prevalence rate among randomly selected market women (n=348) were conducted concurrently.

The systematic random sampling method was used in recruiting participants for studies 1 and 2, and the sample size was 348.

Objective 3: This described the relationship among demographics, MetS predictors and knowledge of MetS. This was followed (sequentially) by studies 3 and 4 which were also conducted concurrently.

Objective 4: A relationship was established among the MetS predictors and Quality of life Domains

Objective 5: A quantitative survey on quality of life was conducted on a sample (n=100) of market women who participated in studies one and two and were identified to have metabolic syndrome with the aim of describing their perceptions of their quality of life.

The sample size for study 3 was a census of all market women (n=100) identified to have metabolic syndrome.

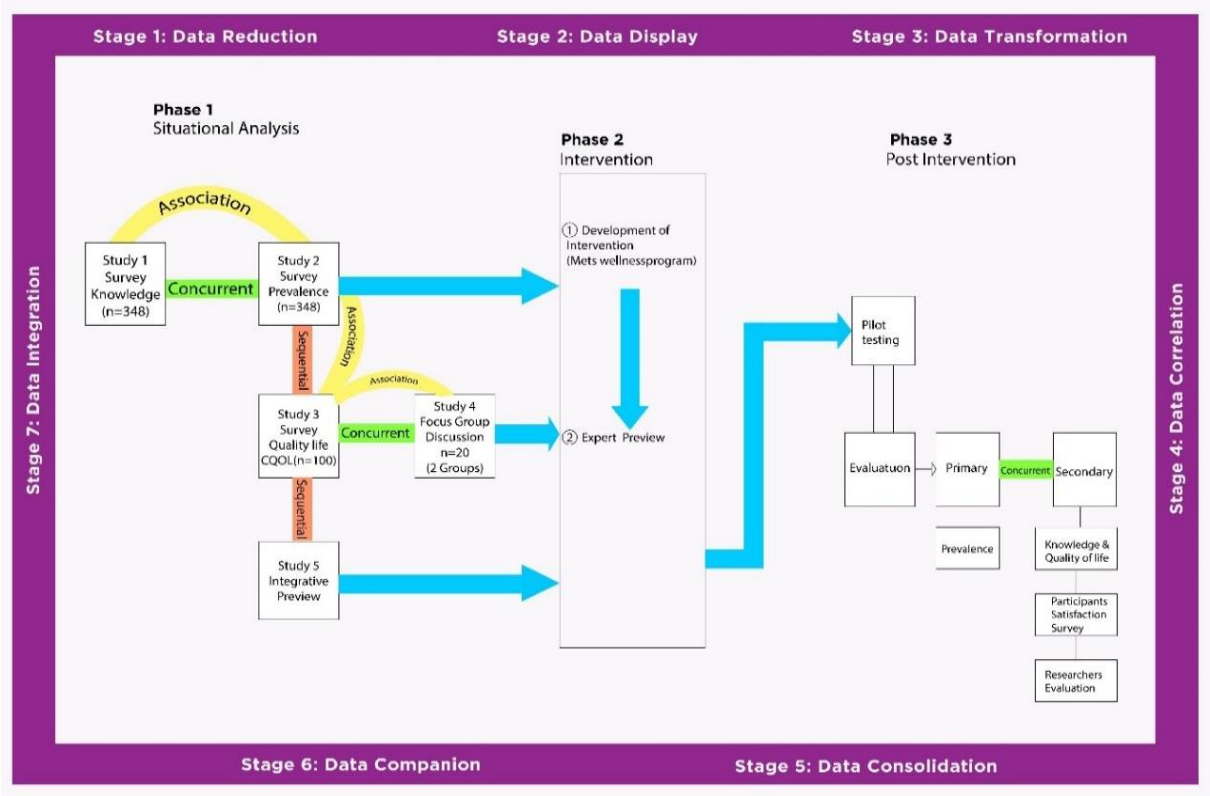
Objective 6: was achieved through two focus group interviews exploring the market women's opinions regarding activities that could be implemented to improve health outcomes of women identified to have metabolic syndrome. A purposive sampling method was used for selecting typical subjects or MetS positive women who participated in studies one and two. The Focus Group Discussion was facilitated with women of each group. Data saturation was reached after the second group.

Objective 7: Involved the exploration of documented intervention or health promotion programmes for metabolic syndrome using search engines data bases such as PubMed, Science Direct and CINAHL.

Data Analysis

Quantitative and qualitatively analysed data were triangulated in conjunction with Creswell and Plano-Clarke (2011)'s criterion for mixing as well as Onwuegbuzie and Teddlie (2003)'s seven staged mixed method data analysis to develop a MetS intervention for market women at Kaneshie as described in phase two and depicted in Figure 1.5

Figure 1. 5: The Multiphased Mixed Method Design & the Seven-Stage Mixed Methods



Data Analysis (Onwuegbuzie and Teddlie, 2003)

Phase 2: Development and Expert Review

This involved the development and expert review of a MetS intervention programme targeted at increasing health outcomes and quality of life of market women identified to have signs suggestive of metabolic syndrome as well as those at risk based on the situational analysis in phase one. A team of experts at University of Ghana reviewed the developed MetS intervention programme. The team consisted of two members of non-governmental organization involved in health promotion programmes, a dietician, a physical therapist, a nurse from the Kaneshie market clinic and a medical practitioner as well as a representative of the market women.

Phase 3: Pilot Testing and evaluation

Phase 3 followed on with pilot testing and evaluation of the MetS intervention programme outcomes. Three post-intervention surveys which consisted of Knowledge and prevalence of MetS as well as the quality of life of women with MetS were implemented concurrently (n=70). An association was then established between them at the discussion stage. The findings of the post intervention surveys were compared to the pre-intervention analysis in order to evaluate the primary and secondary outcomes of the MetS intervention programmes.

Table 1. 1: A Summary of the Research Methods

	Objectives (Steps)			Design/ Approaches	Sample and Sampling	Data Collection Process	Instruments	Analysis
PHASE 1 (Pre-Intervention)	1) To describe the knowledge of metabolic syndrome among market women in Accra, Ghana			Quantitative Design	Market women who meet the inclusion criteria - Age 25-65 - Permanent stall - Language (Twi & English) Systematic Random Sampling n = 348±10% (Raosoft, 2005) All market women with MetS will be eligible for the study	Structured interview	See et'al(2010) K-MS scale Expert review of questionnaire	Descriptive and inferential statistics (STATA)
	2) To explore the prevalence of metabolic syndrome among the market women			Quantitative design		Anthropometric and physiologic measurements	Pre-validated and calibrated equipment	Descriptive and inferential statistics (STATA)
	To establish the correlation among demographic data, knowledge and prevalence of MetS							Descriptive and inferential statistics (STATA
	3) To describe the quality of life of market women identified to have metabolic syndrome			Quantitative design		Structured interview	A 26- item WHOQOL BREF(2005)	Descriptive and inferential statistics (STATA)
	4) To establish the correlation among QOL domains and MetS predictors			Quantitative design				Descriptive and inferential statistics (STATA
	5) To explore the opinions of the market women on the measures that could be implemented to improve health outcomes of women with metabolic syndrome			Qualitative exploratory design	All market women with MS will be eligible for the study	Focus Group Discussion	Semi-structured interview guide	Thematic Content Analysis
	6) To explore documented health promotion programmes or interventions for metabolic syndrome			Integrative literature review	Qualitative and Quantitative articles	Desk Top Search Search Engine- CINAHL, PubMed, etc.		Meta-synthesis and Meta-analysis
PHASE 2	7) Develop a health promotion programme			Quantitative and Qualitative data triangulation (Onwuegbuzie & Teddlie(2003) guided by Pender (1996)'s health promotion programme				
	8) Conduct an expert review				Experts			
PHASE 3 (Post-Intervention)	9) Pilot test the health promotion programme			One-group pre-test-post -test design	All market women with MS will be eligible for the study	Developed health promotion programme		
	Evaluation	Primary outcome	Market women's metabolic syndrome status	Survey	All market women with MS will be eligible for the study	Anthropometric and physiologic measurements	Pre-validated and calibrated equipment	Descriptive and inferential statistics (STATA)
		Secondary outcome	Market women's knowledge of metabolic syndrome	Survey		Structured interview	See et'al(2010) K-MS tool	Descriptive and inferential statistics (STATA)
			Market women's quality of life	Survey		Structured interview	A 26- item WHOQOL BREF(2005)	Descriptive and inferential statistics (STATA)
			Researcher's evaluation of programme success	Women satisfaction survey		Structured interview	A 12- item programme satisfaction tool by Neil & Heyliger(2002)	Descriptive and inferential statistics (STATA)

1.10 THESIS STRUCTURE

This thesis begins with chapter one, which provides an orientation to the study, background and justification for conducting this study. It also provides an overview of the structural setting and organizational structure of the Kaneshie market, the setting for the study and the theoretical foundations of the study.

Chapter two also focuses on the conceptual framework applied in the study and related literature review. Chapter three entails the design and research methods used in conducting the study.

Chapters four (Phase 1), describes two quantitative surveys which explored the knowledge and prevalence of metabolic syndrome (MetS) among Market women in Kaneshie. It also explored the correlation among demographics, knowledge of MetS and MetS predictors. It also describes a quantitative quality of life survey, and established the relationship among quality of life domains and MetS predictors. A qualitative focus group discussion (which was done to solicit the opinions of the participants about practices and lifestyle contributing to quality of life and health improvement) was conducted among market women identified to have metabolic syndrome. Each data set was analyzed within the parameters of its own paradigm, and the discussion of the findings jointly presented. The research methods, results and discussions are described. The chapter also describes an integrative literature review of metabolic wellness programmes or interventions done by other researchers across the globe.

Chapter five presents data mixing, the development and expert review as well as pilot testing of the MetS intervention programme among market women with and at risk of metabolic syndrome who participated in phase one of the study. The approach and methods employed as well as details of the intervention are also presented.

Chapter six also describes the evaluation of the MetS intervention programme and outcomes. A description of primary evaluation which entails a post intervention knowledge, and a secondary evaluation which assessed the post intervention prevalence of metabolic syndrome and quality of life of the market women are presented. The research

methods, results and discussion are described. It also presents the researcher's evaluation and participants' evaluation of the intervention programme.

Chapter seven, the final chapter, presents the summary and concluding remarks, the study limitations as well as recommendations for reducing the incidence of MetS among market women and Ghanaian women in general. Table 1.2 shows the structure of the thesis.

Table 1. 2 Structure of the Thesis

	CHAPTER	DESCRIPTION	
	Chapter 1	Background and Rationale & Conceptual Framework and Literature Review	
	Chapter 2	Literature Review	
	Chapter 3	Research Methodology	
PHASE ONE (PRE-INTERVENTION	Chapter 4	Market women Survey	Prevalence of MetS
		Market women Survey	Knowledge of MetS
		women	Relationship among demographics, knowledge of MetS and MetS predictors
		Market women with MetS Survey	Quality of Life
		Women	Relationship among QOL domains and MetS Predictors
		Market women with MetS Qualitative data	(Opinions about healthy living) Focus Group Discussion
		Integrative literature review	Documented MetS wellness or intervention programmes
PHASE TWO ----- (INTERVENTION PHASE)	Chapter 5	Data Mixing Interpretations, Development, Expert Review and Pilot Testing of MetS Intervention programme	
PHASE THREE (POST INTERVENTION	Chapter 6	Market Women with MetS, Surveys	Prevalence of MetS
			Knowledge of MetS
			Quality of Life
	Chapter 7	Main Findings, Recommendations and Limitations	

1.11 SUMMARY

This chapter discussed the background and setting for the study. The structure of the thesis, theoretical foundations of the study (paradigmatic perspective) as well as the purpose of conducting the study, problem statement, research objectives and research methodology are also presented. Definitions of concepts have been included to explain and clarify terminologies used in the subsequent chapters of the thesis.

CHAPTER TWO

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

2.1 INTRODUCTION

This chapter describes Pender (1996)'s Health Promotion model which was the framework adopted for this study. The model was used to identify key constructs that should be researched for the purpose of this study. Furthermore, arranging and grouping the identified concepts provided meaning and direction regarding the design of intervention programmes that may improve the quality of life of women with MetS.

A literature search process which was conducted to discover existing scientific facts about prevalence of metabolic syndrome, Knowledge about MetS, Quality of life of people identified to have MetS, as well as lifestyle modifications and intervention programmes for MetS is also described.

2.2 THE HEALTH PROMOTION MODEL (HPM)

The Health Promotion Model is aimed at improving the health outcomes of patients (Pender, 1996). The model is applied in research and education, and it is mainly centered on helping people achieve higher levels of well-being. The model also equips health professionals to empower patients to adopt positive and healthy behaviors. The HPM is aimed at assisting patients to prevent illness and explore ways by which individuals can achieve an optimal health by putting up positive behavior.

The HPM was developed based on the assumption that the quality of life of patients could be improved through preventive rather than curative measures. The HPM is aimed at equipping nurses to gain insight into the key factors predicting health behaviors which will serve as the foundation for providing guidance for individuals to positively modify their lifestyle. The HPM is said to be very useful in designing nursing interventions (Pender, 1996). Hence the researcher's decision in adopting the model for this study.

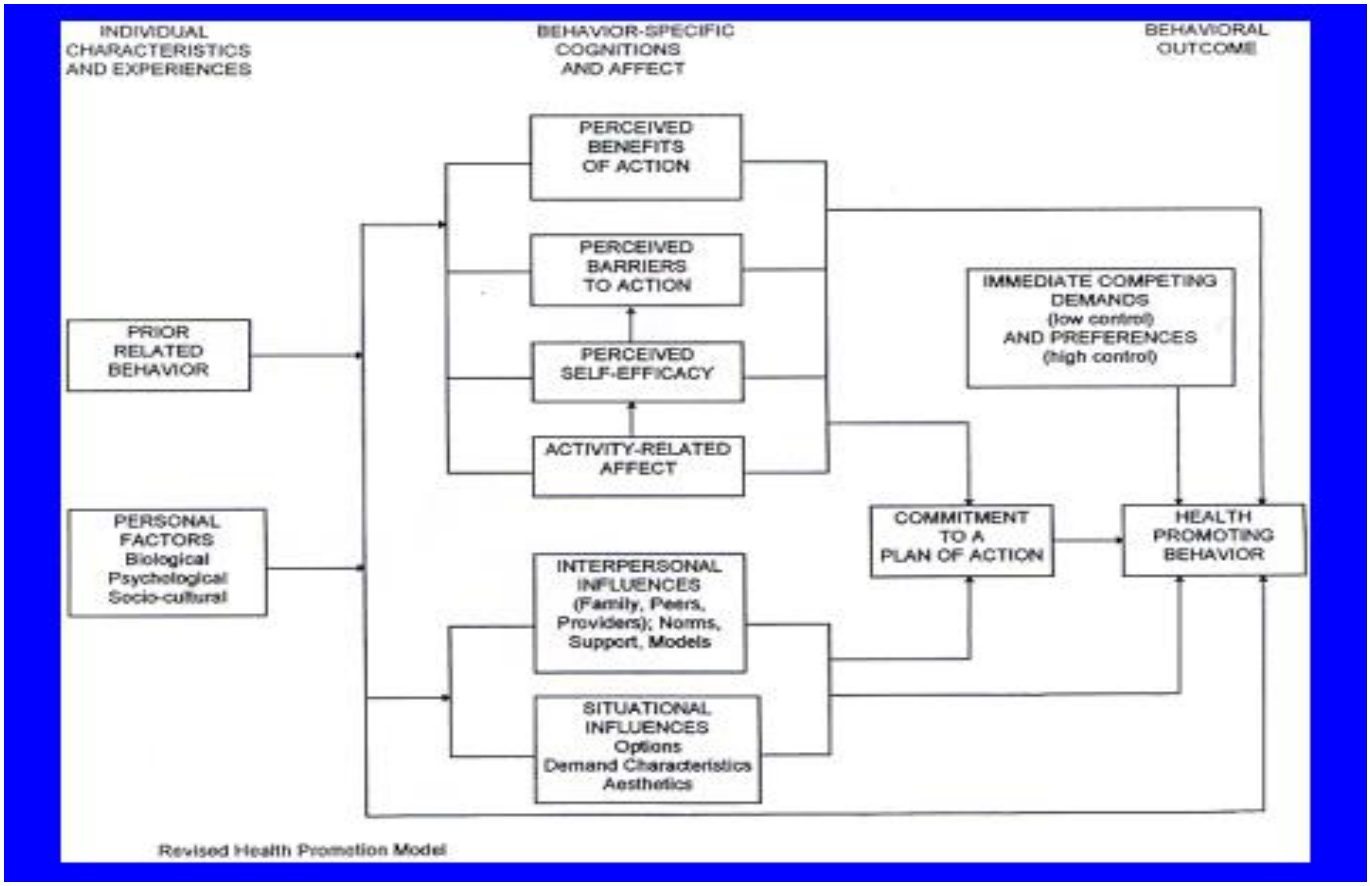


Figure 2. 1: Major Concepts of the Health Promotion Model (Pender et al., 2011)

2.2.1 Major Concepts of the Health Promotion Model

Pender's Model Focuses on Three Areas which are:

- Individual characteristics and experiences,
- Behavior-specific cognitions and affect, and
- Behavioral outcomes.

2.2.1.1 Definitions of the Components of the Model and Application in this study

A. Individual Characteristics and Experiences

This entails prior related behavior which is described as similar previous behaviour and personal traits of the individual (Pender, 1996). In this study, individual characteristics and experiences is likened to the market women's knowledge about metabolic syndrome.

- Personal factors are also described as characteristics such as age, race, ethnicity, and socioeconomic status that influence health behavior (Pender, 1996). It entails:
- Biological personal factors which include variables such as age and body mass index.

- Psychological personal factors such as self-esteem, and an individual's definition of health.
- Socio-cultural personal factors also include education, and socioeconomic status.

In this study, the researcher's main aim was to design an intervention programme for market women with MetS as well as those at risk in order to help them increase control over, and improve their health, taking into consideration their personal characteristics.

- **Application in this study**

In this study, individual characteristics of the market women included their age, gender (demographic data) and body mass index which were all very relevant to this study. Participants' age was taken into consideration in the course of collecting data. Okafor (2012) asserted that the prevalence rate of MetS is becoming alarming in Africa, and it is said to be associated with ageing, hence there is the need to explore the ages of participants in carrying out a research on metabolic syndrome. The likelihood of women gaining weight after giving birth as well as the adoption of Western lifestyle were observed to be contributory factors to the development of MetS among women in Ghana (Arthur et al, 2013). The study was therefore carried out among women. Obesity and abnormalities in lipid profile according to Okafor (2012) are considered to be the most common predictors of metabolic syndrome, therefore the BMI and MetS status of participants in this study were assessed.

Market work associated causes such as a lack of exercise and proper nutrition due to Preoccupation of the market women with trading activities, and ignorance about the effect of this kind of work environment could make market women liable to the development of MetS.

B. Behaviour-Specific Cognitions and Affect

These include:

- **Perceived benefits of action** – these connotes the benefits of undertaking a health behavior.

- **Perceived barriers to action** – The realization of obstacles that prevents an individual from putting up a health behavior.
- **Perceived self-efficacy** – The capability of an individual to enforce a health promotive behavior.
- **Activity-related affect** –This entails subjective feeling about a specific health behavior.
- **Interpersonal influences –** This entails the influence from significant others such as family, members, peers, norms, social support and role models that may impact on an individual's health behavior.
- **Situational influences** – These relate to the influence of the environment on an Individual's health behavior. Such as perception of options available, as well as demand characteristics and aesthetic features available in which health promotion is proposed to take place.
- **Commitment to a plan of action** –This is associated with one's intent to adopt a health behavior and putting in place plans for achieving the health behavior.
- **Immediate competing demands and preferences** – This include alternate behaviors that are adopted before the implementation of a planned health behaviour (Pender, 1996).

  In this study, the market women's perceptions of what constitute good health as well as behaviors that will improve health were explored through a focus group discussion.

- **Application in this study**

In this study, the behavior-specific cognitions and affect related to the market women's knowledge on MetS, their perception about their quality of life as well as their opinion about practices that affect their health both positively and negatively, and what could be done to improve their health. The market women expressed various sentiments regarding barriers to healthy living and lifestyle modifications contributing to positive health outcomes. The women mentioned factors such as late closure of work and busy work schedule as well as the lack of time for engaging in exercises as some of the obstacles preventing them from adopting positive health behaviors. They also lamented that the kind

of environment they work in as well as peer influence from colleague market women especially with regards to availability and intake of ‘’unhealthy foods’’ greatly affected their health behaviors and health outcomes. The women also attested to the fact that they were very much aware that they need to change their lifestyle, but found it difficult to do so due to the nature of their work. Some of the market women however showed readiness for change in lifestyle and embraced the Mets intervention programme. This contributed positively in reducing the incidence of MetS among them and improving their health outcomes.

According to Arthur et al. (2013) factors such as regular exercises and ingestion of diet low in calories as well as less intake of alcohol have been shown to reduce the prevalence and gravity of MetS in women. In this study, the market women's perception about the intervention programme was assessed and the researcher also evaluated the participation of the women in the intervention programme.

C. Behavioral Outcome- Health Promoting behaviour

Behavioral outcome which is also referred to as health promoting behavior, was described in HPM as the main goal in health decision-making.

In this study, behavioral outcome entailed assessment of the efficacy of the MetS intervention in reducing Mets prevalence.

Application in this study

In this study behavioral outcome entailed the adherence of the market women to the designed MetS intervention programme and the outcome of the intervention was its effectiveness in reducing the incidence of MetS among the market women and improving the quality of life of market women with MetS.

Grandner et al., (2012) stated that health professionals especially nurses are very skillful and knowledgeable in empowering individuals and communities to improve health outcomes. This informed the researcher's main aim of designing an intervention programme for the market women.

Physical activity, weight management and proper nutrition are said to be key factors contributing to the reduction in MetS prevalence and cardiovascular risk factors (Lee et al., 2016). In this study, a three-month Exercise and diet intervention programme contributed immensely in minimizing the occurrence of MetS and improving the quality of life of market women with MetS.

2.2.2 Key Concepts in nursing in relation to the Health Promotion Model.

The four basic concepts which provide the structure for addressing the problems of patients as a whole. Included in the discipline of nursing are health, environment, person, and nursing (Chinn & Kramer, 2011). These have been captured in the Pender (1996)'s Promotion Model. There is interconnectedness among the basic concepts of the metaparadigm. Similarly, health-person-environment-nurse interactions also occur as individuals and families move on the illness wellness quantum.

These four metaparadigms (person, environment, nursing and health) have been described in Chapter one section 1.7.2 in relation to this study. However, with reference to the HPM,

Person: Person is described as "a biopsychosocial organism shaped by the environment'' (Pender, 1996). In this study, person referred to the market women in Kaneshie.

Environment according to the HPM is the physical, social, and cultural world in which an individual operates and it has a great impact on an individual (Pender, 1996). Environment in this study referred to the market setting where the market women operate and actively engage in their trading activities.

Nursing according to Pender (1996)**,** entails working together with individuals, families, and communities in order to provide a conducive environment for the attainment of optimal health. In this study, nursing pertained to the collaboration with the market women as well as the development of an intervention programme for improving the quality of life of market women identified to have MetS as well as those at risk of MetS.

Health according to the HPM, is defined as the state of actual or complete wellbeing of individuals which may be inherent or acquired through positive behaviors such as competent self-care as well as satisfactory relationships with significant others, and

interaction with the environment (Pender, 1996). In this study, health was related to the market women's physical, psychological, social and environmental well-being, and pertained to the attainment of quality of life.

2.2.3 Assumptions of the Health Promotion Model

The HPM makes four assumptions which are very vital in designing an intervention such as a MetS intervention programme. These assumptions were outlined by Pender et al., (2011) as follows:

1. Individuals play a vital role in shaping their own behavior.
2. Individuals are in constant interaction with the environment.
3. Health professionals, such as nurses have interpersonal relationship with people and may positively influence the lives of individuals.
4. One's own initiative in the person-environment interactive process plays a key role in adopting a positive or negative health behavior (Pender, et al., 2011).

In this study, the market women were expected to play a key role in adopting a lifestyle that may contribute to the improvement of their quality of life. Market work related factors such as lack of physical activity due to pre-occupation with work as well as availability of ''unhealthy food'' in the market are seen as environmental factors that negatively influence the health behavior of the market women. It was anticipated that the development of a metabolic syndrome intervention programme by the researcher, and the cordial interpersonal relationship and rapport established between the market women, researcher and research assistants may have a positive impact on the health outcomes of the market women. The market women's willingness to adopt the MetS intervention programme as well as their initiative in engaging in other forms of exercises could contribute to the improvement of their quality of life.

2.2.4 Significance of the Health Promotion Model

The HPM posits that nurses could empower patients directly or indirectly to improve upon their quality of life by getting them to adopt to healthy lifestyles. These roles of nurses are considered to be beneficial to individuals and the society as a whole. (Peterson & Bredow, 2009). The propositions of the HPM are well spelt out, and the philosophical claims are

clear. The model has several dimensions and has an impact on health, person, environment and nursing. The HPM is significant because it has proven beyond every reasonable doubt that its usefulness could not be underestimated in various settings such as the home, workplace and healthcare centers (Peterson & Bredow, 2009). The HPM is considered to be very appropriate for conducting researches which are centered on stress and weight management as well as exercise, and are useful for designing nursing interventions and care plans (Peterson & Bredow, 2009). Pender (1996)'s model is very relevant in nursing practice and research and it contributes immensely to the body of knowledge of the discipline of nursing and also plays a vital role in advancing nursing (Peterson & Bredow, 2009).

2.3 SUMMARY

In this section, Pender (1996)'s HPM which is one of the components of the conceptual framework used for the study was discussed. The Core Concepts of the model were analyzed to identify key concepts that could possibly be used to guide research areas for development of an intervention programme for Market women identified to be at risk or have metabolic syndrome.

The HPM is appropriate for this study as it attempts to describe the various ways and forms an individual interacts with his environment and the impact that has on his health. Furthermore, each person is described as having personal traits and experiences that affect health promoting behavior. It is also envisaged that nurses to a large extent, could exert some influence on patients and the effect could live with the patient for a lifetime (Pender et al., 2011). Therefore, the application of this model to the study, contributed to the design of a MetS intervention programme taking into consideration, participants' personal characteristics and preferences. These factors could result in a behavioral change modification that could help improve the health outcomes and quality of life of women with metabolic syndrome in Ghana.

2.4 LITERATURE REVIEW

This section describes, summarizes, evaluates and clarifies relevant information pertaining to the research topic. The section reviewed literature and published studies on metabolic

syndrome. Multiple sources of relevant literature such as; CINAHL with full text, PubMed and Biomed Central and Science Direct were used for the literature review.

The review focuses on describing previous empirical studies conducted by other researchers on the prevalence, and knowledge of metabolic syndrome, quality of life of people with metabolic syndrome as well as lifestyle modifications, and interventions for reducing metabolic syndrome parameters. Part of the reviewed literature was later used to compare findings of the current study results and discussion chapters.

These related literatures were reviewed in line with the conceptual framework adopted and the objectives of the study. Globally, in recent times, a number of researches have been done on metabolic syndrome. This gives clear evidence that "metabolic syndrome" has become an issue of great concern lately.

Scope of the Literature Review

The scope for the literature review included:

1. Prevalence of Metabolic Syndrome
2. Knowledge of Metabolic Syndrome
3. Quality of life of People with Metabolic Syndrome
4. Lifestyle and its effect on metabolic syndrome
5. Interventions for metabolic syndrome

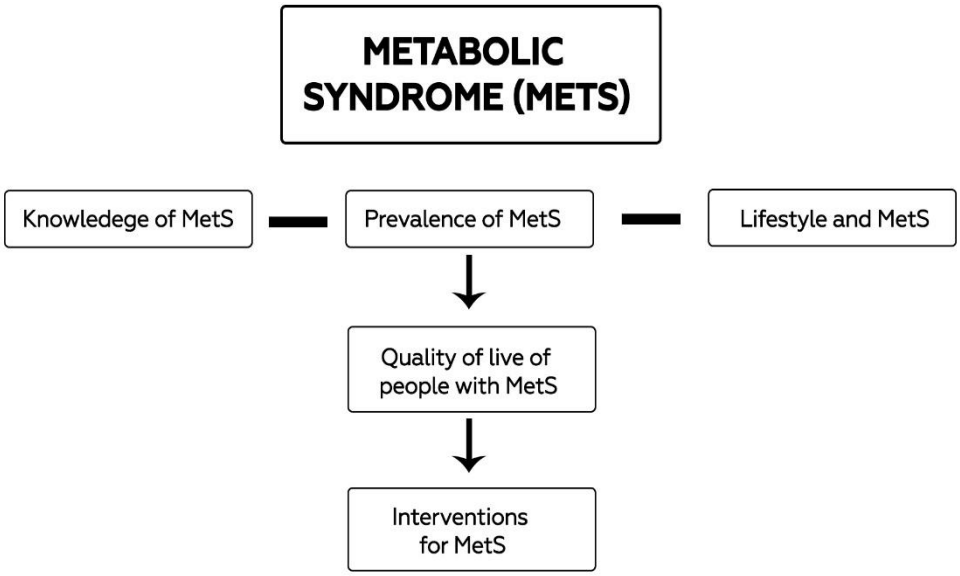


Figure 2. 2: Scope of Literature Review

2.4.1 Prevalence of Metabolic Syndrome

Prevalence in this study connotes the number of persons who have metabolic syndrome in a particular population at a given time. The prevalence of metabolic syndrome varies across different populations (Okafor, 2012). Factors such as age, gender and educational level have been found to be associated with MetS (Khalid et al., (2018) Sarma and Srikanth (2015).

Sarma and Srikanth (2015) conducted a study on prevalence of metabolic syndrome in a rural area of Andhra Pradesh. Women within age 40-50 had 63% prevalence rate of MetS. The results brought to fore that the risk of MetS increased with advancement in age. Similar findings were reported among women from Eastern Cape, South Africa (Owolabi et al., 2017). The women in the study who were aged 26 years or more had 25% probability of developing MetS.

Múnera et al. (2012) also explored the environmental factors of young people from Medellín. The results revealed high triglycerides (40.9%) level, increase blood pressure (20.9%) and; low HDLc, 15.6%. Metabolic syndrome was found to be prevalent in youngsters with obesity (3.1%).

Apart from age, gender mediates the risk factors contributing to MetS prevalence. The risk of metabolic syndrome is higher in women. Mandob and Viviane (2017) found 39% prevalence rate of MetS civil servant women living in Yaounde, Cameroon and concluded that women were at greater risk after menopause due to the influence of hormones (Ziaei, et al., 2013). Osman et al., (2015) revealed in a study conducted in Sudan that the prevalence of metabolic syndrome among postmenopausal women was 51.4%. Similarly, Tsou, et al., (2014) in Northern Taiwan revealed that 34.3% of participants had Metabolic Syndrome, out of which 29.5% were female. However, in contrast to other studies Martínez-Torres et al. (2017) in a study in Columbia revealed that the prevalence of Metabolic Syndrome was found to be higher in men than women. The men in this study had 9.1% risk of metabolic syndrome compared with 3% in women (n = 890). Notably, the respondents were younger (18- 30 years). The differences in age and the measures could have influenced the outcome in this study. However, the authors argued that some other studies supported their findings (De Freitas et al., 2013).

A few studies established that low level of education contributed to the prevalence of MetS (Silventoinen et al., 2005; Owolabi, et al., 2017; Nsiah et al., 2015). Owolabi et al., (2017) identified in their study that prevalence of Metabolic Syndrome was increased with low level of education. Other suggestive but not clearly defined factors such as marital status and employment status have been mentioned to affect MetS prevalence (Owolabi, et al., 2017).

The prevalence of MetS is determined by indicators that strongly predict the risk and outcome of MetS (Mandob and Viviane, 2017); Anas Ahmad Sabir, et al., 2015). Abdominal obesity, increased blood pressure and high fasting blood glucose contribute to the development of MetS. In women, obesity particularly lipid deposition around the

waistline (Osei-Yeboah et al., 2017), high cholesterol levels along with other related risk factors will result in cardiovascular disease, diabetes and other lifestyle related diseases.

Prevalence of MetS in patients diagnosed with some of the lifestyle related diseases such as type two diabetes mellitus was observed to be high ranging between 43.8- 58% (Osei-Yeboah et al., 2017 Nsiah et al., 2015). Nsiah et al., (2015) conducted a study in Ghana to assess the physiologic indicators and anthropometry of patients receiving care for type two diabetes mellitus. Notably, the findings showed hypertension as a common phenomenon, which was also reported by Osei-Yeboah et al., (2017).

Osei-Yeboah et al., (2017) reported a cross-sectional study on the prevalence of MetS among type two diabetic patients in the Ho Municipality of Ghana. The outcomes in respect of each measure were: NCEP-ATP III (43.83%) WHO (63.58%), and the IDF (69.14%). In a very recent study, Osei-Yeboah et al (2018) again found out that the prevalence of hypertension and prehypertension among civil servants in the Sefwi Wiawso Municipality were 16.07% and 52.68% respectively. About 38.39% of participants were overweight, while 12.50% were obese. The incidence of other MetS parameters were as follows: Dyslipidemia was 26.79% whereas pre diabetes glycemic levels and diabetes incidence were 5.41% and 4.50% respectively. 50.00% of participants presented with at least one MetS indicator. Aging and Obesity were found to be associated with MetS. The findings further highlight the contribution of obesity to the prevalence of MetS.

In summary, the evidence on prevalence of metabolic syndromes suggest that aging, being an older female or younger male and pre or postmenopausal states are some of the moderating factors accounting for the rate at which MetS is affecting the general population. Hypertension and diabetes mellitus are some of the outcomes associated with MetS. However, the actual risk factors include blood pressure level, blood glucose level, triglyceride level, waist circumference and body mass index. The requirement of lifestyle modification as one of the measures for curbing the risk or minimizing the effect of MetS is well documented; nevertheless, this is dependent on the knowledge about metabolic syndrome.

2.4.2 Knowledge of Metabolic Syndrome

Knowledge in general terms connotes facts, information and skills acquired through experience or education (Webster's dictionary, 2011). In this study, knowledge pertains to the theoretical or practical understanding of metabolic syndrome. Lewis et al., (2008) in Gyakobo et al (2012) stated that there is generally lack of knowledge on the concept of MetS in Africa. According to Arthur et al (2013), the lack of knowledge regarding metabolic syndrome could make women prone to the development of MetS.

According to a cross sectional study undertaken by Joshi et al (2013) a lower level of knowledge on MetS was reported among individuals aged 30 years and above living in India. Statically, the authors who sought to evaluate the knowledge and perceptions about Mets and its related management crisis showed that only 10% of the individuals had moderate knowledge about lifestyle behaviors which served as risk factors for acquiring Mets.

Unlike Joshi et al. (2013) who revealed lower level of knowledge on Mets, Amarasekara, et al (2016) in their study stated that respondents felt more knowledgeable and had a higher attitude towards the decrease of CVD. The study sought to understand knowledge, attitude and practices about cardiovascular disease risk factors among adults aged 35-55 years about MetS. This may be due to an emergency awareness of MetS that have high prevalence rates in Sri Lankan. However, knowledge and practice in some particular areas were low regardless of regular medical checkup upon diagnosis with Non-Communicable Diseases (NCD).

Similar views were echoed by Lo et al (2016) who explored the level of knowledge on Mets among adults in China. The author reported that majority of the respondents (61%) had significantly poor level of knowledge about Mets by scoring below 50. It is of interest to note that, the author advocated that obtaining knowledge on Mets is essential as it results in the prevention of type 2 diabetes or stroke.

According to a self-reported online questionnaire by Yahia, et al., (2014) in Central Michigan University, a moderate level of knowledge (80%) was reported as students were able to identify common signs and symptoms of Mets. The researchers further pointed out

that students' knowledge on MetS could be improved through creation of awareness about MetS based on students' pre-existing knowledge. This might support the notion that students can act as health ambassadors for Mets in their various communities as they progress through their academic years.

Similarly, Marwa, Latifa, and Amnah (2016) also measured the awareness and knowledge level of a section of students from the University of Tabuk. It was revealed that the students had poor knowledge about the manifestations and complications of arteriosclerosis and stroke. Although majority of the students were knowledgeable about the manifestations and complications of the MetS predictors and most of the students could correctly recognize symptoms and complications of diabetes, hypertension, serum cholesterol level and obesity, lower scores were observed in the students' knowledge about manifestations, complications and treatment of atherosclerosis and stroke. Therefore, it could be concluded that student's personal involvement leads to greater interest in subject matter.

Tsou (2017) also carried out a study to examine the relationship of education, health behaviors, concerns, and knowledge of metabolic syndrome (MetS) among urban elderly living in northern Taiwan. Results from the study revealed that high educational level influences the development of MetS and hence, there should be the development of health education programs that could enhance the prevention and self-monitoring of MetS.

Cortez et al (2018) also indicated that 60.5% of participants were females. The level of knowledge of students improved from 20.9% to 55.8% after the interventions. In conclusion, the researchers stated that educational intervention increases the knowledge level of MetS.

Wang et al., (2019) also assessed the level of knowledge of patients in a Chinese hospital diagnosed with MetS using a MetS Knowledge Scale, (MSKS). The majority of participants had a history of hypertension (54%), dyslipidemia (79%), or diabetes (85%) and , 56% of these participants were found to have at least three cardio metabolic risk factors, indicating the presence of MetS. The average MSKS was very low (mean = 36.7±18.8), indicating the need for MetS education in health practice.

2.4.3 Quality of Life of People with Metabolic Syndrome

In this study, quality of life refers to the ‘’standard of health, comfort and happiness experienced by an individual or group of people identified to have metabolic syndrome. It entails physical, social and psychological state of the individual’’. The effects of metabolic syndrome on sexual functioning as well as sleep pattern are also captured.

According to Tziallas et al. (2012), metabolic syndrome has a negative impact on health-related quality of life and as well affect physical and mental health of individuals with depression being the commonest symptom.

Consistent with Tziallas et al., (2012), Lee (2012)’s also found out that, metabolic syndrome impaired the quality of life of individuals. However, unlike Tziallas et al., (2012), Lee (2012) revealed that quality of life among MetS positive individuals had no link with their educational level, age, gender, and marital status.

Amiri et al (2014) in a study to assess quality of life of women with MetS averred that in Iran, women with metabolic syndrome had poor physical health. Similarly, Slagter et al., (2015) also identified that Type 2 diabetes and high body mass index generally affects quality of health. Slagter et al., however in addition reported that MetS may affect mental health resulting in emotional instability. The researchers again reported that the social life of individuals may be affected by the prevalence of MetS. In Taiwan, Hung et al. (2015) however averred that, although the prevalence of Mets was found to be high, their Participants reported having good interpersonal relationships.

Carvalho-Lima et al. in 2017 explored the quality of life of patients with metabolic syndrome after whole body vibration exercises (WBVE) to prove that exercises contribute positively in improving the social life of individuals with MetS.

Carvalho-Lima et al., (2017) again brought to fore that, participants in both interventions had tremendously improved in their social and physical health after a whole-body vibration exercise. However, participants in the first group unlike the second group, improved in their psychological and environmental health as well. The differences in the results may be attributed to the different intervention or treatment meted out to each group.

In the same year, Ejtahed et al. (2017) also found out in a study that 62.1% of their amputee participants were found to be suffering from MetS. However, both the negative and positive for MetS participants relatively scored low on the SF- 36 quality of life scale, hence had poor quality of life. A similar and more recent study was carried out in India by Nabamita & Dipayan (2018). However, unlike Ejtahed et al. (2017) which was done among adults, Nabamita & Dipayan (2018)'s study sought to find out the association of MetS and health related quality of life among young adults aged 18 to 25 years, and only the participants with MetS were found to have lower quality of life scores.

2.4.4 Mets and Sexual Dysfunction (SD)

Studies have been conducted to assess the relationship which exists between metabolic syndrome and sexual dysfunction. Using the Golombok Rust Inventory of Sexual Satisfaction Tool, Amidu et al., (2013) established that there was a positive relationship between MetS and sexual dysfunction among 300 diabetic patients. It was again reported in their study that other factors such as age and how long the individual had been living with diabetes could worsen the already existing health concern of MetS. This was in relation to the fact that high abdominal obesity and increased blood pressure were MetS components which saw peak values among those who were older and were diagnosed with diabetes for a very long time.

Similar studies carried out by Otunctemur et al. (2015) among females especially using Female Sexual Function Index also indicated sexual dysfunction existed among pre and postmenopausal women with MetS. This indicates that irrespective of the gender of an individual, MetS could cause sexual dysfunction.

2.4.5 Sleep and Metabolic Syndrome

Emerging evidences from various scholars have placed tags on the important role sleep plays in maintaining metabolic homeostasis (Koren, et al., 2016). Sleep is a form of intense rest where the body regains its lost energy and vitality. It therefore indicates that sleep is very important for the general well-being and function of every system in the body.

For some reasons, alterations in the body could distort the regular patterns and quality of sleep and in severe cases, may lead to sleep disorders. Okubo et al., (2014) study revealed

that based on the Pittsburgh sleep quality index (PSQI), participants diagnosed with MetS recorded high values under sleep latency score and sleep disturbance score. This indicates that the participants could be said to suffer some quantum of sleep disorders based on the PSQI assessment. Kim, et al., (2018) also reported similar results where poor sleeping patterns were recorded in both men and women with elevated waist circumference.

2.4.6 Lifestyle and its Effect on Metabolic Syndrome

Lifestyle in this study, means the way in which people live or practices and behaviors of individuals and its effect on the incidence of Metabolic Syndrome. It also entails environmental risk factors that contribute to the development of MetS.

Lin et al. (2013) in a study among the elderly which sought to investigate MetS and its association with health behavior indicated that the prevalence of new cases of MetS in the elderly resulted from lack of exercise. On the other hand, Lin & Chu (2014) in a regression analysis revealed that characteristics such as smoking, intake of alcohol, marital status, religion and chronic disease were predicted to affect the Health Promotion lifestyles of individuals and may predispose them to the development of MetS.

Nagahama et al. (2014) also examined individuals' self-reported eating rate and its association with metabolic syndrome. The results suggested that poor eating habits may predispose individuals to MetS. In a different context, Janczura et al. (2015) revealed that exposure to job-related stress among police officers in Poland increased the prevalence of MetS.

Sutherland LL, et al (2014) also reported that a person's health behaviour or lifestyle may result in a predisposition to MetS. However, the researchers further found out that both their male and female participants with MetS had high abdominal obesity, while the males had high fasting blood sugar, triglycerides and high blood pressure compared to the females.

Smoking predisposes the individual to MetS by 26% because nicotine found in most cigarettes causes hormonal and neurotransmitter activities that leads to the release and breakdown of fatty acids. Smokers tend to have built a lot of fat around their abdomen

(Slagter et al. 2013). Similarly, alcohol consumption increases MetS risk. Although the risk for MetS is lower for moderate consumption of alcohol, in cases of hard liquor consumption the risk for MetS increases (Slagter et al. 2013). Notably, Gepner et al., (2015) in a randomised controlled trial (n = 224) revealed that drinking wine in moderation may reduce some of the risky elements of MetS. VanWormer et al (2017) revealed that lifestyles such as smoking and alcohol intake increases risk of MetS while eating fruits, vegetables and exercises reduces the risk.

In Taiwan, a 60% prevalence of MetS was reported among old adults and health promoting behavior was identified as a contributory factor to this high prevalence rate of MetS (Huang et al., 2015). In like manner, Dussaillant et al. (2016) also conducted a study among elderly Chilean patients which sought to evaluate the association of MetS prevalence with eating habits of participants. A 37.7% prevalence of MetS was reported among elderly patients aged 65 and above, and this was attributed to factors such as low fruit and vegetable intake and high intake of dairy products. The results of the above two studies on elderly patients depict that lifestyle is a number one predisposing factor that contribute to the development of MetS among this population.

Liu et al (2017) also revealed in a study which explored the association of self-reported physical activity with MetS that, individuals with minimal physical activity were more likely to have MetS than those who are physically active. Poor dietary habits were also found to be a contributory factor to MetS prevalence.

2.4.7 Environmental Risk Factors and MetS

The environment is a risk factor in the development of MetS and refers to the surroundings of an individual including natural forces and social lifestyle and how these affect individuals and influence their choices. Gosadi (2016) noted that the interplay of genetic and environmental factors was key in the development of MetS. Behaviour towards eating, engagement in activity are important environmental risk factors that needs to be explored (Gosadi (2016).

The literature on environment risk is diverse and is linked to lifestyle risk. The other elements such as activity and diet have been largely explored in other sections. The

dynamics in the environmental risk factors is how to enhance a pattern of life that ensures health promotion and improves quality of life. A number of interventions for MetS have been found to enhance preventive and rehabilitative dimensions of managing MetS.

2.4.8 Intervention for Metabolic Syndrome

In this study, interventions imply actions taken or wellness or health promotion programmes designed by other researchers for addressing the challenges associated with MetS.

Lee, Kim, & Jeon (2016) stated that physical activity had a positive impact on MetS. This was the outcome of a cross-sectional study which examined relationship between physical activity and MetS prevalence. Physical activity ensures that calories are broken down through the energy exerted during those activities. WHO (2009) recommends daily activities such as walking at faster pace and aerobics as healthy ways of getting rid of excess fat

Blackford et al., (2016) also carried out a randomised controlled trial intervention study which revealed that physical activity contributes in reducing MetS prevalence. Blackford et al., (2016) however used a combination of physical activity, nutrition, and weight management and the duration of their study was six months. Whereas Lee, Kim & Jeon (2016)'s intervention was done for only six weeks using a one group pre and post-test design and was based on physical activity only.

Borkoles, et al., (2016) examined the effects of a 3-month lifestyle intervention among obese women. The intervention was community based. Consistent with the previous studies described above, Borkoles, et al., (2016) also found a positive correlation between lifestyle intervention and MetS, however, their study revealed that there was no improvement in BMI and weight after the intervention although their study was also done for a period of 3- months.

Similarly, Gerstel et al., (2013) also reported a 50% decrease in MetS prevalence among the intervention group after carrying out a 12-month educational programme which

comprised physical activity and diet therapy. This result may be attributed to the long period used by the researchers in carrying out the intervention.

Jahangiry et al., (2017) also revealed in a two-arm interactive web-based research using emails that the intervention group showed much improvement with regards to MetS indicators after a period of 6 months in Tehran, Iran. Participants in the intervention group were given information through emails on diet and physical activity.

Similarly, Baetge et al (2017) in the same year, examined the effects of commercial weight loss programs on the reduction of MetS prevalence and weight reduction. The researchers found out that the intervention resulted in weight loss among participants unlike Borkoles et al., (2016) who found no decrease in body weight. The intervention also resulted in the improvement of the MetS predictors as well.

2.5 SUMMARY

In this section, a review of previous studies on metabolic syndrome was done. Critical core constructs of Pender's health promotion model related to the context of the study on development and pilot testing of a metabolic syndrome intervention were identified and used as a guide to identify key areas for the literature review.

Even though a lot of studies had been done by other researchers assessing the knowledge and prevalence of metabolic syndrome as well as the quality of life and effects of lifestyle on metabolic syndrome, none of the studies has been carried out among market women. It is evident that there is paucity of research in Ghana and globally on MetS among market women, hence the need for this study.

CHAPTER THREE

RESEARCH DESIGN AND METHODS

3.1 Introduction

In the chapter 2, literature review was conducted on published studies related to MetS in line with the conceptual framework adopted and the objectives of the study as presented. In this chapter, the overall strategy used in carrying out the study is presented. This entails the study setting, research design, participant selection process as well as data gathering and analysis. Measures for ensuring trustworthiness and reliable results as well as ethical considerations pertaining to this research are also discussed.

Phase 1: is categorized as both the pre-intervention phase and the situational analysis phase which consists of five objectives. These include:

- To explore the knowledge level on metabolic syndrome among market women in Accra, Ghana.
- To explore the prevalence rate of metabolic syndrome among the market women.
- To establish the relationship among demographics, knowledge of MetS and MetS predictors.
- To describe the quality of life of the market women identified to have metabolic syndrome as well as those at risk of the syndrome.
- To establish the relationship among QOL domains and MetS predictors.
- To explore the opinions of the market women about measures that could be implemented to promote health in women identified to have signs suggestive of metabolic syndrome or are at risk.
- To explore the documented MetS intervention programmes for promoting health in metabolic syndrome.

Phase 2: Phase two is also classified under the pre-intervention aspect of the study. To guide the researcher with the implementation of this phase, two objectives were developed as follows;

- To develop a MetS intervention programme for market women in Accra, Ghana identified to have signs suggestive of metabolic syndrome.
- To conduct an expert review of the intervention program.

Phase 3: This is described as the intervention and post-intervention phase. The main objective of this phase was to pilot test and evaluate the outcomes of the MetS intervention program.

3.2 Research Setting

The study was conducted at the Kaneshie market, in Accra which is one of the ten biggest and renowned markets situated in the Western part of the capital of Ghana (as described in detail in chapter one).

3.3 Research Design

Choosing an appropriate design for a research is a strategy enables the researcher achieve a flawless process during data collection and result interpretation (Creswell and Plano-Clarke, 2011).

3.4.1 The Multiphase Mixed Method Design

In this research, a multiphase mixed method research intervention design was employed. There are several mixed methods designs that could be applied in a study which is to be conducted quantitatively or qualitatively. These include: the convergent parallel, explanatory sequential, exploratory sequential the embedded and transformative mixed methods design. However, these designs are not suitable for complex projects such as the investigation of metabolic syndrome.

For this research, the process of investigating MetS among market women required both quantitative and qualitative interviews, anthropometric and physiologic measurements as well as integrative literature review. In addition, the need for more than two phases and a combination of concurrent and sequential aspects in different areas were identified. It is in this context that a multiphase mixed method design was deemed as appropriate for this study.

The multiphase mixed method intervention design for this study was based on Creswell and Plano-Clarke (2011)'s four key aspects pertinent for deciding on which mixed method design will be suitable in achieving the objectives of this study. A brief description of the four key aspects and the implementation thereof in this study is presented.

Interaction: "This refers to the extent to which the strands are kept independent or interact with each other in the research process". In this research, data collection for objectives one and two that is Knowledge and MetS prevalence were done concurrently. Although data collection was concurrently implemented, the two studies were analysed independently and an association was established between them during the discussion phase. The concurrent stage was followed by implementation of studies three and four, which namely; the quality of life survey and a focus group discussion. These studies were also done concurrently during the data collection process but data interaction occurred during the data analysis process. Study five, the integrative literature review was however, done independently.

Priority: This aspect concerns the type of information considered as important. For the purpose of this study, all information gathered were treated equally important to contribute to bringing the objectives to fruition. In this study, all data collected were regarded as equally important as they all formed part of the building blocks towards designing an intervention programme This is despite the fact that only one qualitative study, and one literature review was conducted compared to the three quantitative surveys.

Timing: Timing pertains to implementation and relationship of the qualitative and quantitative strands in the research process". In the context of this study, timing occurred during the data collection, analysis and discussion stages. In order to address the overall research objective in phase one, one quantitative survey (a quality of life survey), study 3, and a qualitative focus group discussion, study 4, were done concurrently after which the two studies were merged at the analysis and discussion phases.

Mixing: "Mixing refers to the period of combining and interrelating the study's quantitative and qualitative strands" (Creswell and Plano Clark, 2011). In this study, mixing was done prior to the development of the MetS intervention programme and it occurred during analysis and interpretation of data collected. This involved merging the quantitative knowledge of MetS and prevalence of Mets, as well as merging the quality of life of market women identified to have MetS with the qualitative focus group discussion, while the integrative review was done independently.

3.4.2 Intervention Studies

An intervention study is a purposive step-by-step activity characterized by the ability to cause change when effected (Fraser, Richman & Galinsky 2010; Thiese, (2014). Nursing interventions are actual treatments and actions that are performed to help individuals and their families reach planned goals (Bulecheck et al., 2013). In the community health nursing context, intervention studies are designed to prevent illnesses, promote health as well as correct deviations from health state and rehabilitation.

In the context of this study, the one group pre and posttest intervention design was adopted. A one group pre and post-test design is an experimental research design which involves the use of only one group of samples which is given a pre-test before an intervention or treatment is given and a posttest after the intervention or treatment has already been given (Polit and Beck, 2018). In the pre-intervention stage of this study, the market women's knowledge and prevalence of MetS were assessed. This was followed by their perception about their quality of life as well as their opinions about programmes that will be implemented to improve their health. The participants then enrolled in the MetS intervention programme and were again exposed to a posttest after the programme implementation. In the posttest, all the three surveys were done again, except the qualitative focus group discussion.

In the subsequent sections, the research design, methods, study population and sampling techniques as well as the data gathering process and analysis of data are discussed.

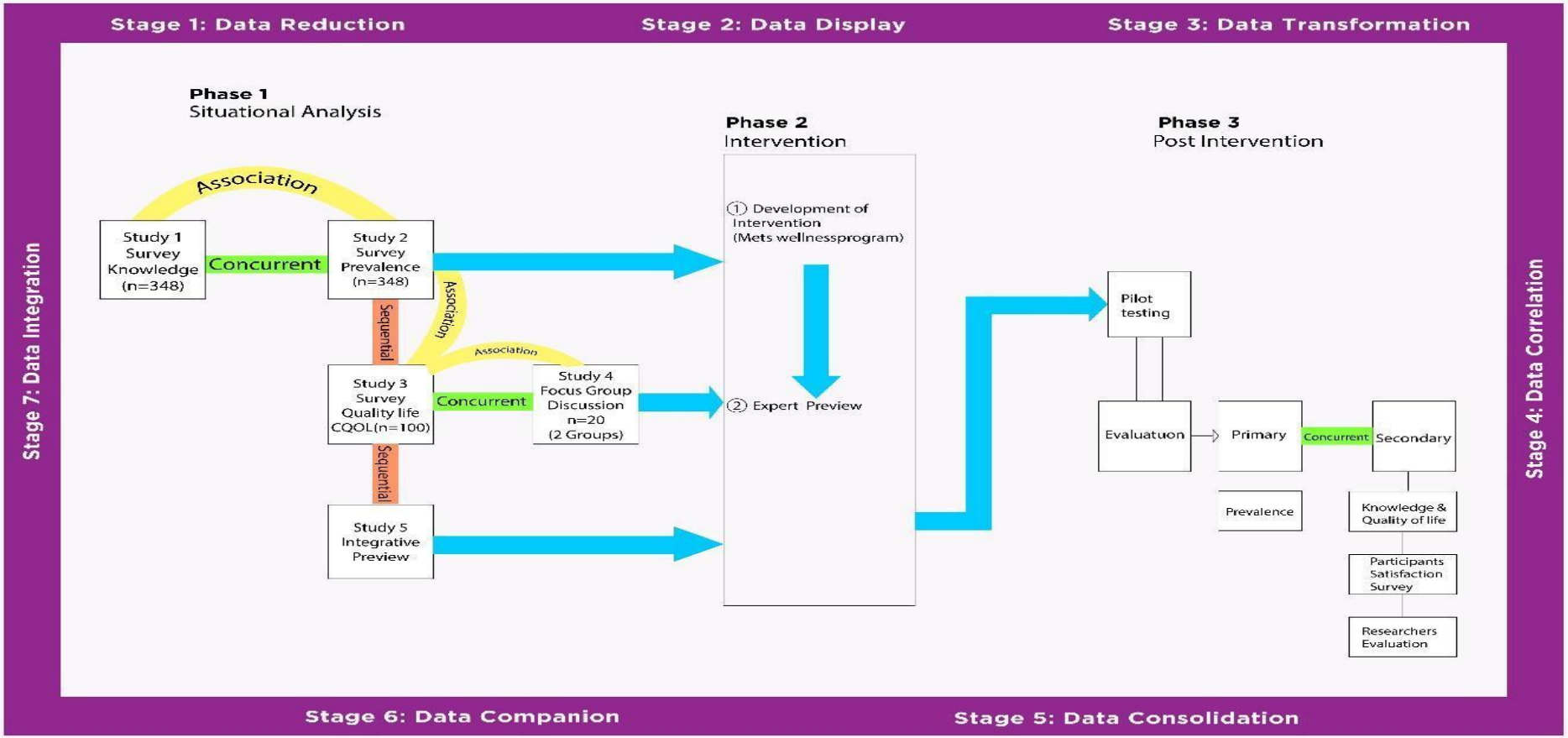


Figure 3. 1: The Multiphase mixed method design & Seven-stage mixed method data analysis (Onwuegbuzie and Teddlie, 2003)

PHASE 1

Quantitative Studies

This phase entails three quantitative surveys and a qualitative focus group discussion

3.5.1 Knowledge of Metabolic Syndrome

Objective one involved exploring the knowledge of metabolic syndrome among the market women in Kaneshie, Accra-Ghana.

3.5.1.1 Research Design

A quantitative survey was conducted in order to achieve the objective. Surveys are brief interviews and discussions with individuals about a specific topic (Check & Schutt, 2012). For the purpose of this objective, a general survey design was used to explore the demographic characteristics of the market women as well as their knowledge of metabolic syndrome.

3.5.1.2 Study Population, Sample Size and Sampling Procedure

- **Target Population**

The population for this study consisted of market women trading at the Kaneshie market (N=4030).

- **Sample Size**

The sample size used for the knowledge survey was 348 (n = 348) plus 10% calculate using a confidence interval of 95%, taking into consideration a marginal error of 5% and a response distribution of 50%. The Raosoft computer software programme was used for calculating the sample size (Raosoft, 2005)

- **Sampling Procedure**

Women who volunteered to participate in the study and met the inclusion criteria were selected through systematic random sampling (Brink, Van der Walt &Van Rensburg, 2012). This gave them an equal chance to be in the study

A research awareness creation was done in the market using a public address system prior to commencement of the study.

A complete and up to date sample frame was acquired by obtaining a register of female stall occupants which had a record of 4030 market women from the market administrator.

The research assistants were assigned to the various floors in the market for identification of stalls that were operational to help obtain the sample frame. Women who were interested in the study were placed in a list. About a thousand two hundred (n=1200) market women showed interest in the study. These participants were further briefed that they will be randomly selected and only those whose numbers will be picked will participate in the study.

The interested respondents were then identified by their stall numbers. Thus, stall numbers were used as consecutive identification numbers for each participant in the list. Each element in the list was numbered sequentially such that each could be easily identified. Respondents were given participant information sheet, further explaining the aim of the study and expectations from them. They then endorsed the consent form indicating their agreement to participate in the study.

A fixed starting point was randomly chosen, and a constant interval of 3 was selected. This interval was obtained by dividing the total number of the population of women who were interested in the study, by the sample size as indicated below:

Accessible Population = 1200

Sample size=348

Constant interval =1200/348 =3.4

Every third person in the list was chosen until the required sample size (n=348) was met.

3.5.1.3 Inclusion and Exclusion Criteria

Women at the market aged 25 to 65 years, who could speak English or the common Ghanaian language (Twi) and in addition have a permanent stall at the market were eligible for the study. However, women who were customers coming to buy at the market, and market women who did not have permanent stalls at the market were excluded from the research.

3.5.1.4 Data Collection Instrument and procedure

The researcher gathered data through a structured interview from a sample of market women involved in trading activities at Kaneshie through structured interviews (Researcher-administered questionnaire) (Polit & Beck 2018).

See et al (2010)'s Knowledge on metabolic syndrome (K-MS) questionnaire was used for data collection (Appendix 4). The questionnaire addressed the knowledge of participants with regards to MetS indicators, as well as the complications, prevention and treatment of MetS. The K-MS (2010) consisted of the demographic component and ten questions exploring knowledge of metabolic syndrome. The Chinese K-MS (2010) questionnaire was sent to the University of the Witwatersrand Language Centre for translation into English. A question exploring MetS among men was removed as the focus of the study was on women. To ensure content validity, expert rating for item relevance was done to validate the questionnaire using Fleiss (1971) Content Validity Index scale.

The researcher presented the questionnaire to five experts for perusal; a researcher from the University of Ghana, three experienced clinical nurses, and one medical doctor for review. The method of evaluating the data presented in the questionnaire was provided. The questionnaire was edited by applying the suggestions/recommendations from the experts. The experts recommended that the word metabolic syndrome, should be reworded and changed to risk factors for the development of heart diseases and stroke to suit the market women since it was too technical. Secondly, dyslipidemia was also changed to high blood cholesterol/cholesterol abnormalities, and uric acid abnormalities was also changed to urinary abnormalities as suggested by the experts.

3.5.1.5 Measures of Instrument Validity and Reliability

Validity is the degree to which an instrument measures what it is supposed to measure in order to claim the truthfulness and accuracy of the findings (Polit and Beck, 2018), and reliability is the consistency of the measurement. (Grove, Burns and Gray, 2013).

To ensure validity and reliability of the instrument and data generated in this study, the following measures were taken:

The K-MS questionnaire used for the knowledge of MetS data collection was adopted from See et al (2010). The questionnaire which was originally in Chinese language was translated into English with permission from the authors. The questionnaire was then translated into the local common Ghanaian language (Twi) and modified to suit the context. Back translation to English was done to ensure face validity. The authors of the K-MS questionnaire conducted a Cronbach's Alpha statistical test to ensure reliability of the K-MS questionnaire. The Cronbach's Alpha statistical test is the most widely used test for evaluating internal consistency, and its scores communicate reliability statistics. It measures the extent to which the performance on any one item of an instrument is a good indicator of the performance in any other item in the same instrument (Brink et al, 2012). The K-MS questionnaire had been used by other authors; Lo et al (2016) to assess the knowledge of MetS among Chinese adults.

In this present study, the instrument was submitted to reliability testing after completion of data collection. In addition to the above, the K-MS questionnaire was pre-tested on 10 market women at a different market (Makola market) with similar characteristics to ensure the items in the questionnaire actually measure what they were expected to measure.

Validity and Reliability of the Data Generated in this Study

The sample size (n=348) of the market women was calculated using Raosoft (2005) sample size calculator with a marginal error of 5% and a confidence interval of 95% in order to minimize sampling error.

A structured interview, specifically a researcher administered questionnaire was used to gather data on the knowledge of metabolic syndrome to prevent selection bias due to literacy levels in the study sample.

3.5.1.6 Data Collection Procedure

After obtaining permission from the management of the Kaneshie Market, the researcher then visited the market, and had an interaction with the market women to brief them about the research, and give clarifications and explanations to questions asked by interested participants. Other measures were the use of a public address system to make announcement or carry information to the market women concerning the intended study

and its purpose, as well as distribution of participants' information sheet. Notices were also pasted on the walls of the market, and flyers were also given out to the market women. Market women who met the inclusion criteria and agreed to participate were individually approached and requested to sign a consent form for the knowledge survey as well as for anthropometric measurements (Appendix 4 &5).

Data collection for the knowledge of metabolic syndrome was done concurrently with the prevalence of MetS. Appointments for filling in the questionnaire and for the anthropometric measurements were negotiated with the participants of the study who had signed the consent form. They were then invited to the private room for health screening at the market administration for the data collection. The data collection process extended over a period of seven days.

Data collection for the prevalence of MetS was done concurrently with the knowledge of MetS data. Appointments for filling in the questionnaire and for the anthropometric measurement were negotiated with market women who agreed to participate in the study, and had signed the consent form. The researcher and all research assistants reported at the market at 5:30 am on the days set for the data collection, and the various stations for the commencement of data collection were set up. This was deemed necessary because, the participants usually come to the market as early as 5am to start their trading activities. Most of the participants also take early breakfast with the reason of having enough energy for the arrangement of their wares and for the day's work.

Five stations were set up during the data collection for steps 1 and 2 which entail the Knowledge and Prevalence of metabolic syndrome.

Table 3. 1: Steps for the Data Collection Process

Stations	Steps of Data collection
Station 1	Welcoming and registration of participants and administration of the knowledge of MetS questionnaire
Station 2	Measurement of weight, height, waist and hip circumference
Station 3	Assessment of Blood pressure. (It was anticipated that participants would have been relaxed by the time they get to this station
Station 4	Checking of Fasting Blood Glucose. To ensure reliability of results, the fasting blood glucose level was checked between the hours of 6am and 930 am.
Station 5	Taking of blood samples for lipid profile analysis.

In this study, researcher administered data collection was done using See et al (2010) K-MS questionnaire through a structured interview and answers given by participants were recorded on the questionnaire (Appendix 4). A researcher administered questionnaire was used because the demographic data of participants revealed that majority of them were illiterates and semi-literates who could not read nor write both the Twi and English language. Data collection continued until the required sample size (n=348) was met and was done for a period of one week.

3.5.1.7 Data Analysis

Polit and Beck (2018) refer to data analysis as the systematic organization and synthesis of research data, and the testing of a research hypothesis using those data. In this study, the questionnaires were coded, the data were then cleaned, captured on a Microsoft Excel spreadsheet and imported into the Statistical software package "STATA version 13". Descriptive statistics presented in the form of frequencies, percentages and means of the findings as well as inferential statistical tests were then used to summarize, organize and present the data.

3.5.2 Prevalence of Metabolic Syndrome

Objective two entailed Anthropometric and Physiologic measurements to establish the prevalence rate of metabolic syndrome among the market women in Kaneshie market in Accra, Ghana.

3.5.2.1 Research Design

The survey design was used to explore and describe the prevalence of metabolic syndrome among the market women.

3.5.2.2 Study Population, Sample Size and Sampling Technique

The prevalence of metabolic syndrome survey was conducted concurrently with the knowledge survey using the same sample size and sampling technique as described in section 3.5.1.2.

3.5.2.3 Data Collection Instrument

Table 3.2 below provides information on anthropometric measurements that were conducted followed by the Physiological measurements as illustrated in table 3.3.

Table 3. 2: Anthropometric Measurement Scales (Delport & Vander Sloten, 2015, Jarvis, 2012)

Measurement	Instrument
Weight	An Adam Medical (R), electronic digital scale calibrated to the nearest milligram at weight range of 0- 250kg
Height	A stadiometre attached to an electronic digital scale foot pedal
Waist circumference	A calibrated flexible plastic measuring tape
Hip circumference	A calibrated flexible plastic measuring tape

To assess participants' anthropometric measurements, the following instruments were used:

- An Adam Medical (R), electronic digital scale calibrated to the nearest milligram at weight range of 0- 250kg was used for checking the weights of participants

- A stadiometre attached to an electronic digital scale foot pedal was used to check participants' height.
- Waist and hip circumference circumferences were also assessed using a calibrated flexible plastic measuring tape

Table 3. 3 Physiologic Measurements

Blood pressure	This was checked by the use of an electronic aneroid sphygmomanometer,
Blood Glucose	A hemoglucometer manufactured by Accu-check(R) was used
Blood Cholesterol Analysis	An Accu-check machine was purchased to assess the cholesterol levels, but due to non-availability of the strips in Ghana, the blood cholesterol levels had to be checked at a laboratory in a hospital in Accra Ghana.

The physiologic measurements of clients were assessed by the use of the following:

- An electronic aneroid sphygmomanometer, calibrated before data collection from 0-300mmHg was used to assess participants' blood pressure.
- Blood Glucose of participants were checked using a hemoglucometer manufactured by Accu-check(R)
- Two experienced laboratory technicians working in a Teaching Hospital were employed to do the blood Cholesterol analysis for participants with permission from their employers. Blood specimen were taken from the participants after they had consented by signing a consent form, for lipid profile analysis at the laboratory.

3.5.2.4 Reliability of Anthropometric and Physiologic Measurements and Scales

To ensure reliability in this study, the following measures were applied:

- The researcher approached and employed newly qualified graduate nurses to serve as research assistants. The main principal investigator reoriented and trained the research assistants on how to use the data collection instruments and on how to conduct anthropometric and physiologic measurements. A pre-testing exercise was done to ensure inter rater reliability.

- Height and weight were measured by the trained research assistants with participants wearing indoor clothing without shoes, using a tape measure and standing scale which had calibrations.
- The waist circumference was measured to the nearest centimeter using a flexible measuring tape with the respondent standing. In view of the fact that participants were women, the abdominal circumference (waist) was measured as the narrowest part of the body between chest and hips.
- The blood pressure was checked with participants in sitting position and recorded manually using a standard sphygmomanometer calibrated before data collection from 0-300mmHg, 3–5 minutes after the subjects had been made comfortable, and the mean of three readings at an interval of 5 min rounded off to the nearest millimeter of Hg was recorded for participants whose blood pressures were found to be high.
- A needle prick of the finger was done to obtain a sample of blood from participants after 8 hours of fasting to estimate the fasting blood sugar level using a hemoglucometer manufactured by accu- check. Participants' Serum cholesterol (triglycerides and HDL levels) were also checked by experienced and qualified laboratory technicians. Sterile syringes and needles were used to take participants' blood samples for analysis in the laboratory.
- Anthropometric measurements of the market women were done using standardized instruments guided by the anthropometric indicators measurement guide (Jarvis, 2012, Delport, &Vander Sloten, 2015) to prevent biases.
- Pre-validated or calibrated equipment were used throughout the data gathering process, and the equipment were pre-tested by all the research assistants on 10 market women to ensure inter rater reliability. To do this, the research assistants all used the same equipment to check blood pressure, weight, height and waist circumference, to ensure they had same results and were all on the right path.

3.5.2.5 Data Collection Procedure

As indicated in 3.5.1.5, the knowledge and prevalence studies were done concurrently.

3.5.2.6 Data analysis

Data was cleaned, captured on a Microsoft Excel spreadsheet and imported into the Statistical software package ‘’STATA’’ version 13. Data was presented by the use of descriptive statistics which involved frequencies, percentages and means of findings as well as inferential statistical tests.

3.5.3 Quality of Life Survey

The purpose in objective three was to explore and describe the quality of life of market women identified to have metabolic syndrome.

3.5.3.1 Research Design

In this study, the survey design was used to explore the quality of life of the market women.

3.5.3.2 Study Population, Sample size and Sampling Process

The population for this study comprised a total sample (census, n=100) of all market women who were identified to have metabolic syndrome or at risk.

All (n=100) positive for MetS women were invited to participate in the QOL survey.

3.5.3.3 Inclusion and Exclusion Criteria

The inclusion criteria comprised all women identified to have metabolic syndrome (n=100). However, market women who tested negative in the prevalence of metabolic syndrome survey were excluded from the study.

3.5.3.4 Data collection Instrument

The WHOQOL BREF 26 item questionnaire was used for data collection (Appendix 6). The WHOQOL BREF 26 is a quality of life tool designed by the WHO (2005). It is made up two main sections, namely sections A and B. Section A entails the demographic data of participants. Section B has four domains which seek to obtain information concerning clients’ physical, mental and social wellbeing as well as environmental factors affecting the health of participants.

Section B of the WHOQOL BREF questionnaire comprises two aspects. The first aspect consists of two individually scored items assessing the individual’s perception of his or her

overall perception of quality of Life, and health. The second aspect produces a profile with four domain scores, each of which is assessed within its own facet. The four domain scores are scaled in a positive direction with higher scores indicating a higher quality of life.

1. The first domain which is physical health entails 7 aspects which include pain, medication, energy, mobility, sleep and rest, activities and capacity
2. The second domain has six aspects described as the psychological domain and this include enjoy life, life meaning, cognition, esteem, body image and negative feelings
3. The third domain which is social domain also consists of three aspects namely social relationships, social support and sexuality.
4. The last domain, environmental domain also comprises seven aspects which are: physical safety and security, health of environment, financial resources, recreation and leisure, access to health care transport and living conditions.

Each of these aspects is addressed on a five- point Likert scale. The questionnaire consists of an assortment of assessment questions; for which participants are expected to state ‘’how much certain things happen, ‘how completely’, ‘how often’, ‘how good’ or ‘how satisfied’ they felt in the last two weeks.

3.5.3.5 Validity and Reliability Procedures

To ensure validity in this study, a structured interview was used to gather the data on the quality of life of women with metabolic syndrome using the WHOQOL BREF 26 to prevent selection bias due to literacy levels in the study sample. In addition, a Cronbach’s Alpha statistical test was conducted to ensure reliability. Cronbach’s Coefficient Alpha scores were calculated to test the reliability of the questionnaire, with specific reference to its internal consistency.

3.5.3.6 Data Collection Procedure

Data collection for the QOL survey was conducted concurrently with the Focus Group Discussion presented in section 3.5.4.

A census (n-=100) of all the market women who tested positive for MetS were divided into four groups and invited to the private room at the market administration in turns to give them feedback on the results of the knowledge and prevalence of Met individually. They were then invited again to participate in the quality of life survey and the focus group discussion, which they all agreed to take part. A date and time were scheduled with the women to hold a meeting with them in order to explain the purpose of the next stage of the study. During the interaction with the women, clarifications and explanations were given to questions asked by them. They were also given participants' information sheet spelling out the purpose of the survey and what was expected of them, after which they were given the consent form to sign. An appointment was then booked with the women to schedule a date for the data collection for the quality of life and focus group discussion. The data collection for both studies again took place at the market place health room.

The quality of life survey was the first to be conducted and data was collected using the WHOQOL BREF 26(2005) item questionnaire. A researcher administered interviewing was done to elicit information from the participants, regarding their quality of life. This was followed by the focus group discussion.

1. The first discussion lasted for 45 minutes, after which the recorded interview was played in the presence of the participants for them to confirm if the tape was a reflection of the issues discussed. The second group of market women were then invited for their turn of the discussion, and this lasted for 50 minutes. The participants were thanked and informed that they will be invited again for the pilot study of the MetS intervention programme.

2. Personal notes of the researcher's observations, reflections and evaluation were taken during the focus group discussion, and notes were recorded to serve as a reminder for the methodological approach (Polit and Beck, 2018).

3.5.3.7 Data Analysis

In all, a total of 100 questionnaires were issued and all were returned. The questionnaires were thoroughly checked for completeness and coded into a Microsoft Excel spreadsheet using a personal computer secured with a password.

Data analysis was done using the test dataset and SPSS code for scoring the WHOQOL-Bref (2005) ("WQ_BREF.TXT") and an SPSS code (called "WQ_BREF.SPS"). The 4 domains were then scored, labeled, and transformed to a 0 to 100 scale used for interpretation.

After scoring the test dataset, descriptive statistics were used to analyze the demographic data, and also for calculating the means, standard deviations, minimum and maximum observed values. The quality of life of each participant was then assessed using descriptive statistics. The Welch T-Test was used to test for significant relationships between quality of life and MetS indicators and the Pearson Correlation Coefficient was also used to test the relationship between different domains. Testing was done at a 0.05 level of significance ($p=0.05$) with a 95% confidence interval and all percentages were rounded up to one decimal place.

3.5.4 Opinions of the Women about Measures for Promoting Health.

The main objective of study four was to conduct a focus group discussion which sought to explore the informed views of the market women about activities or programmes that could be implemented to promote health in women identified to have metabolic syndrome.

3.5.4.1 Research Design

The qualitative exploratory research design was used for exploring the informed views of the market women regarding activities that could be implemented to improve health outcomes of women with MetS. The exploratory design was chosen for the focus group discussion because, it was deemed more practical and appropriate since the researcher sought to explore the opinions of market women, gain insight into their views of possible measures for improving health outcomes in metabolic syndrome, and to accurately describe the dimensions and meanings of their opinions (Polit and Beck, 2018). This informed the

development of a wellness programme for market women with metabolic syndrome, as well as those at risk.

3.5.4.2 Study population

The population for this study comprised a census of all market women (n=100) who took part in the knowledge and prevalence surveys, and were identified to have metabolic syndrome.

3.5.4.3 Sample size and Sampling Method

The focus group discussion was done concurrently with the quality of life survey. However only a few participants agreed to participate in the FGD after they had participated in the quality of life survey, since they were anxious about going back to their stalls. The remaining number of women were grouped into 10s for inclusion in the focus group discussion.

3.5.4.4 Data Collection Instrument

A semi-structured interview guide made up of one main and three probing questions was used in gathering data. (Appendix 7). The main question for the focus group discussion was formulated as**; 'Please tell me, in your opinion what are the practices that may help to improve health outcomes?** The researcher however probed further during the group discussion in order to obtain in-depth information, and clarify aspects related to the women's opinions about measures that could be implemented to promote their health. Participants' demographic data was taken during the quality of life survey.

3.5.4.5 Data Collection Method

The data collection process was facilitated by first administering participants' information sheet to obtain consent for participation (Appendix 7-7.11). Two Focus Group Discussions were held with the first group of (n=10) women, followed by the second one. The first discussion lasted for 45 minutes, after which the recorded interview was played in the presence of the participants for them to confirm if the tape was a reflection of the issues discussed. The second group of market women were then invited for their turn of the discussion, and this lasted for 50 minutes.

However, data saturation was reached after the second group interviews.

Data saturation or data adequacy was reached when there were no new emerging ideas in the data. Data was presented in a chart format providing a visible approach to data analysis and saturation. The participants were thanked and informed that they will be invited again for the pilot study of the Mets intervention programme (Polit and Beck, 2018).

Personal notes of the researcher's observations, reflections and evaluation were taken during the focus group discussion, and notes were recorded to serve as a reminder for the methodological approach.

3.5.4.6 Data Analysis

Analysis of the qualitative data was done after the focus group discussions had been completed, and the answers to each question were studied as soon as interview starts.
In the context of this study, the data analysis process for this study commenced with repeatedly listening to the recordings to gain sense of the interviews and verbatim transcription of the recorded interviews. Thematic content analysis was then used in analyzing the qualitative data. This entails identification, coding and categorizing of the primary patterns in the data. Coding is the process of identifying persistent words, phrases, concepts, and themes within the data (Polit and Beck, 2018).

In this research, the coded words were highlighted and put into categories and sub-categories, and a summary was written for each category. The emerging themes and sub-themes were reviewed by the researcher and the supervisor, and the relationship among categories were used to describe the opinions of the participants. After the essential structure of the phenomena had been identified, it was compared with the transcripts to make sure it fits the data. Field notes were reviewed to add to the information and the need to go back to the interviewees was assessed.

3.5.4.7 Trustworthiness

Trustworthiness in qualitative research is very important, and the goal is to accurately represent study participant's experiences (Polit and Beck, 2018). {Lincoln and Guba, 1985, cited in Polit and Beck, 2018} used the following terms that describe operational

techniques supporting the rigor of the work: Credibility, Dependability, Confirmability, and Transferability. The researcher therefore implemented these concepts in measuring the trustworthiness of the research findings.

Credibility: To ensure credibility in this research, representative quotations from transcribed words were showed or submitted to experts (supervisor and research mentor) to seek their agreement. Member checks was also done. In this, feedback was provided to study participants regarding preliminary findings and interpretations to secure their reactions. In this research, opportunities were given to participants to confirm and re-interpret the findings thereby ensuring that the reality of their opinions were truthfully presented. In ensuring credibility, peer debriefing was also done and this was organized with peers who are believed to be objective to review and explore various aspects of the inquiry, to cross check whether the researcher was on the right track (Polit and Beck, 2018).

Dependability: In this research, the following were implemented to achieve dependability- The same interview guide was used for each of the two groups involved in the focus group discussion. There was also an open dialogue between the researcher and experts in the field to ensure that similar results will be obtained when the research is replicated. A detailed description and recording of all stages in the research process were provided to enable replication of the research study (Polit and Beck, 2018).

Confirmability is a process criterion, and the confirmability of findings is documented by leaving an audit trail (Polit and Beck, 2018). An audit trail is a recording of activities over time that another individual can follow to confirm the findings. To achieve confirmability, an audit trail of interviews and transcripts as well as drafts of the final report was done. Thus, a systematic collection of documents and recording of activities that allow an independent auditor to come to conclusions about the data was done. The objective is to illustrate as clearly as possible the evidence and thought process that led to the conclusions.

Transferability refers to "the extent to which the findings can be transferred to other settings'' (Polit and Beck, 2018). To achieve transferability, a clear description of procedure for participant's selection, as well as detailed presentations of the process of data

collection and analysis was done. Examples of the data gathered, often in the form of quotations by participants or detailed thick descriptions was reviewed.

3.5.5 Integrative Review

The integrative review aimed at exploring available literature concerning intervention programmes, wellness or health promotion programmes for improving health outcomes and preventing the increased incidence of metabolic syndrome, between 2007 and 2017 as described in details in chapter3.

3.5.5.1 The Focused Review Question was formulated as

What is the available literature on wellness, health promotion or intervention programmes for improving the health outcomes of people with metabolic syndrome?

3.5.5.2 Sampling Procedure

A purposive sampling was done to identify eligible primary sources. The study had no participants; hence consent was not obtained. The review was conducted following the five steps developed by Whittemore and Knafl (2005) namely; Problem identification/formulation stage (Question formulation) literature search stage, data evaluation stage, data analysis stage and presentation stage as described in details in chapter 6.

Data gathering commenced in January 2017 and regular searches were carried out until December, 2017 in order to identify any new researches published, adding them to the main body of the current review. A data extraction sheet was developed to document the required information from each paper. This information included; the journal of publication, year of publication, authors, type of research methods or design used, type and duration of intervention and the effect of the intervention employed in the study.

A comprehensive computer assisted search was done to identify the maximum number of eligible primary sources. To ensure that search strategies were rigorous, an experienced University librarian was first consulted. The search syntaxes were then developed in consultation with the librarian taking into account, a broad range of terms used in relation to intervention, health promotion and wellness programme with the variable's metabolic

syndrome and obesity and risk for heart diseases. Thus, the search had specific focus on intervention for metabolic syndrome as related to health promotion or wellness programme. Reports on interventions for other diseases or medical conditions such as chronic kidney and liver diseases and cancer were excluded. The literature review was done with the supervision of researcher's supervisor and experts with experience in integrative literature review.

3.5.5.3 Sources of Literature

Multiple sources of relevant literature such as; CINAHL with full text, PubMed and Biomed Central were used.

3.5.5.4 Search terms/keywords

The search terms or keywords for this review were as follows:

Intervention OR wellness OR health promotion programmes AND metabolic syndrome OR risk for cardiovascular diseases.

3.5.5.5 Inclusion and Exclusion Criteria

Researches done from the year 2007 to 2017 written in English were selected for the literature review. These researches specifically addressed intervention, wellness or health promotion programmes and metabolic syndrome or risk for cardiovascular diseases. Non-research documents such as dissertation, discussion papers, expert opinions and reports published before the year 2007 as well as articles published in other languages other than English were excluded.

3.5.5.6 Data Analysis

This integrative review employed content analysis to analyze the data. Data from primary sources were ordered, coded, categorized and summarized into a unified, and integrated conclusion about the research problem. All publications identified during the searches were reviewed independently by the researcher, her supervisor and research mentor. List of publications from the databases and other searches were reviewed and publications such as literature review, dissertations, clinical reports, discussion papers and editorials were excluded. Only outputs of published researches were finally captured.

3.6 PHASE TWO: DEVELOPMENT AND REVIEW PHASE

3.6.1 Development of the MetS Wellness Programme (Intervention)

A metabolic syndrome wellness programme based on data triangulation of findings from the situational analysis in phase 1 using the seven-staged mixed method research design by Onwuegbuzie & Teddlie, 2003) guided by Pender's health Promotion model (Pender et al., 2002) was developed.

The emerging results from the knowledge and prevalence of MetS and quality of life as well as the focus group discussion were discussed in relation to prior related behaviour, individual cognition and affect and personal factors as described by Pender (1996) in her health promotion model.

Results for the data concerning the quality of life of women with Mets and the opinions of the women about what constitute good health (FGD) were combined. Results for the knowledge and prevalence of MetS were also combined during discussion.

The last three stages of Onwuegbuzie & Teddlie (2003)'s data analysis together with Nola Pender (2002)'s health promotion model was applied in this study in designing a metabolic syndrome intervention programme (Chapter 5) for market women identified to have MetS as well as those at risk. Results of all the quantitative surveys and the qualitative focus group discussion as well as integrative literature review in phase 1 were combined which informed the development of the intervention (chapter 5).

3.6.2 The Mets Intervention Programme

The intervention programme was made up of metabolic syndrome awareness health talks (on diet, exercise and healthy living), nutrition and a physical activity programme. A well-structured MetS wellness programme made in the form of a booklet was designed in consultation with a dietician and a physical therapist.

3.6.3 Expert Review of the Health Promotion Programme

Review of the MetS wellness programme was done after it had been designed. A team of experts was set up to review the intervention. This comprised; an academician from the University of Ghana, two representatives/ members of non-governmental organizations

involved in health promotion programmes (life after 40 NGO and Ghana Society of Pediatric endocrinology and diabetes-GSPED) a dietician, a physical therapist and a medical practitioner, registered nurse as well as a representative of the market women. (Appendix 10-10.11).

Various suggestions and inputs such as changes in meal times and use of suitable exercises as well as use of simple and appropriate terminologies were given by the team of experts, and this informed the restructuring of the intervention programme to suit the market women, and the Ghanaian context as a whole.

3.7 PHASE 3: IMPLEMENTATION (PILOT TESTING PHASE) / EVALUATION

In phase 3, the designed intervention was pilot tested and evaluated.

3.7.1 Pilot Testing of the Intervention

A pilot study is generally described as a small-scale study or trial run, done in preparation for a major study (Polit and Beck, 2018). Bel, Whitehead and Julious (2018) posited that a pilot study is an important step in the assessment of an intervention as it provides information for designing the future definitive trial.

The population for the pilot study was market women in Kaneshie, Accra identified to have metabolic syndrome. The programme was presented over a period of three months. Seventy (70) out of the hundred (100) market women identified to have tested positive for MetS and three women (3) who belonged to the at-risk group, agreed to take part in the pilot study making a total of seventy-three (73) participants. However, three (3) participants who were members of the pilot study group rescinded their decision and withdrew from the pilot study for personal reasons, reducing the number for the pilot study to 70.

A MetS awareness day was held at the Kaneshie Market prior to the post intervention data collection, with the purpose of creating awareness among market women and the general public. The awareness day was targeted at market women and customers. The programme of activities for the MetS awareness day included health education on MetS as well as mass Blood pressure screening for market women and customers.

3.7.2 Evaluation of the MetS Intervention Programme Outcomes

A one group pre-test post- test design was used to evaluate the primary and secondary outcomes of the health promotion programme (Grove, Burns & Gray, 2013). In this design, there is a single selected group under observation, with a careful measurement being done before applying the experimental treatment or intervention, and then measuring after.

In the current research, the same group of participants served as their control, thus only one group was used. Participants' knowledge, metabolic syndrome status and quality of life were measured again after the intervention, after which the programme was evaluated. The evaluation was done to assess the following:

3.7.3 Primary Outcomes

Market women's metabolic syndrome status were re- assessed through anthropometric and physiologic measurements using a survey design as described in section 3.5.2 of the research process (Appendix 9). Details of the primary outcomes has been outlined in chapter eight.

3.7.4 Secondary Outcomes

The market women's knowledge of Metabolic syndrome was again evaluated using a structured interview by means of the See et al., (2010)'s K-Ms scale (Appendix 3) as described in section 3.5.1 of the research process.

A quality of life survey was again conducted through a structured interview using the WHOQOL BREF (2005) 26 item questionnaire (Appendix 6) as described in section 3.5.3 of the research process.

3.8 RESEARCHER'S EVALUATION

The success or failure of the entire research process was also done through the following means: Market women's participation in the health promotion programme was assessed through observation of willingness to participate through recording of attendance.

In addition, a participant satisfaction survey was also conducted to assess the opinions of the market women about the health promotion programme and the entire research process.

Table 3. 4: Summary of Data Analysis

Objectives	Statistical analysis
1. To describe the knowledge of metabolic syndrome among market women in Accra, Ghana.	Descriptive analysis (Minimum, maximum, Mean and standard deviation. Continuous variables categorised, frequency and percentages reported
2. To explore the prevalence of metabolic syndrome among market women in Kaneshie.	Descriptive analysis (Minimum, maximum, Mean and standard deviation. Frequency and percentages also reported
3. To establish the correlation among demographics, MetS predictors and knowledge of Mets	Inferential data analysis and Welch t-test conducted to establish the correlation among demographics, MetS predictors and knowledge of Mets
4. To describe the quality of life of the market women who have been identified to have metabolic syndrome.	Descriptive analysis (Minimum, maximum, Mean and standard deviation. Frequency and percentages also reported
5. To establish the correlation among Quality of life domains and MetS predictors	Inferential data analysis and Welch t-test, ANOVA and Pearson's Correlation test conducted to establish the correlation among QOL domains and MetS predictors
6. To explore the opinions of the market women regarding the measures that could be implemented to promote health in women identified to have metabolic syndrome.	Content Analysis Coding and categorization done Themes and sub-themes generated
7. To explore documented intervention or health promotion programmes for promoting health in metabolic syndrome.	Descriptive analysis as well as content analysis conducted
8. To develop a Mets intervention programme for market women in Accra, Ghana identified to be at risk or have metabolic syndrome.	
9. To conduct an expert review of the intervention program	
10. To pilot test and evaluate the outcomes of the intervention program.	Descriptive analysis (Minimum, maximum, Mean and standard deviation. Continuous variables categorised, frequency and percentages reported ANOVA, Tukey test, Scatter and Box plots to evaluate effect and success of the MetS intervention programme

3.9 ETHICAL CONSIDERATIONS

The main aim of research ethics is to ensure that appropriate steps are implemented to firstly obtain permission from the institutions. Secondly, to ensure protection of respondents from any maltreatment. Thirdly to make sure that the right to information, privacy and anonymity are not compromised in the research process (De Vos, Strydom, Fouché, & Delport, 2005).

The researcher has gained considerable research knowledge and skills through successful completion of a Master of Philosophy Degree in Nursing and, in addition, has successfully supervised undergraduate and postgraduate students to completion. The research was supervised by an experienced, senior academic researcher. This research project has equal importance for the researcher, and for the management and market women at the Kaneshie market, Accra, Ghana. Care was therefore taken to conduct the study ethically, with integrity and honesty, according to all predetermined and agreed-on arrangements and in accordance with institutional guidance.

There are numerous ethical issues that require attention when conducting research. In this study, all ethical standards related to the respondents, the institution and the research process were observed to guarantee the integrity of the research. Below are the ethical consideration measures employed in this study:

3.9.1 Institutional Permission to Conduct the Study

Permission to conduct the study and Ethical clearance were sought from the Ethical Review board of the Nugouchi Memorial Institute for Medical Research, University of Ghana (Appendix 1 and 1.1) Permission was also obtained from the University of the Witwatersrand Postgraduate and Human Research Ethics Committees. (Appendix 2), and the management of the Kaneshie market, Accra Ghana (Appendix 3 and 3.1).

3.9.2 Data Collection Instruments

A letter of approval was obtained regarding the use of the Knowledge of Metabolic Syndrome prevention questionnaire –KM-S (See et al., 2010). An approval was also given by the authors to translate and adapt the questionnaire to suit the Ghanaian context (Appendix 4 and 4.1).

Permission was sought and granted from WHO to use the WHOQOL BREF 26 (2005) (Appendix 6 & 6.1). Permission was sought for the use of Neil & Heyliger (2001)'s Programme Satisfaction assessment tool-PSAT (Appendix 10).

Participants

The following ethical aspects as described by De Vos et al. (2005) were considered in order to ensure that no harm would be caused to the participants.

3.9.3 Informed Consent

This refers to the right of participants to have access to all information pertaining to the purpose of the study and how the research process will unfold. It is the responsibility of researchers to ensure that they provide adequate and correct information about the research to study participants, and also gain the consent of the participants. The following procedures were followed to gain participants' consent.

3.9.3.1 Quantitative Studies (Pre and Post Intervention)

Quantitative research measures were applied in both the pre and post intervention phases. A written and detailed information letter and informed consent explaining the purpose, procedures and the benefits of the research was obtained from the market women to gain their consent and inviting them to participate in the study. Women with metabolic syndrome were provided with a participant information sheet that explained all the research activities that were to be conducted in both the pre and post-intervention phases (Appendix 8). Written consent to participate in the anthropometric health assessment, quantitative surveys and the qualitative focus group discussion were obtained (Appendix 5, 6, 7 & 9.1 -9.111). Privacy, anonymity and confidentiality were also ensured. Privacy in the context of research refers to agreement between persons and limits others' access to private information (De Vos et al., 2005). The concept of privacy is closely associated with anonymity and confidentiality.

In this study, confidentiality was ensured by proper management of participants' confidential information. No identifying data were requested in the questionnaire, participants' raw data and other personal information were kept under lock and key

and only the researcher had access to the information. However, password protected electronic results was made accessible to the supervisor based at the University of the Witwatersrand. Anonymity and confidentiality were further ensured through the use of pseudo names for qualitative interviewees.

Respondents' results for anthropometric and physiologic measurements results were not disclosed to the management of the market. The anthropometric measurements were done in a private room at the administrative office of the market to ensure privacy of participants.

3.9.3.2 Qualitative Study - Focus Group Discussion

Women identified to have signs suggestive of metabolic syndrome were invited to participate in a focus group discussion exploring their ideas or opinions regarding activities that can be implemented as part of the intervention strategy using a semi-structured interview guide (Appendix 8). Written consent was obtained for focus groups interviews and for audio-recording (Appendix 8.1 to 8.111).

The participants were informed that their names will not be written to ensure anonymity. Furthermore, the interview was scheduled at a time convenient to the market women, and the tapes were kept under lock and key. Only the researcher and her mentor had access to the tapes. However, the transcribed recorded interviews were made accessible to the supervisor at the University of the Witwatersrand for co-coding.

Experts

A letter was written to experts inviting them to review the health promotion programme and gain their consent (Appendix 10 - 10.11).

3.9.3.3: Protection of Study Participants

This concerns the obligation to protect study participants from any harm, including emotional harm. This involves preventing harm, not causing any harm, and upholding their rights. The researcher ensured that the study did not cause harm to any of the participants. Study participants were approached for permission, by signing a consent form following the principle of volunteerism.

A written and detailed information letter was issued to participants explaining the purpose, procedures and the benefits of the research, after which participants voluntarily signed the consent forms. Participants were also informed about their rights to withdraw from the study at any time without penalty. Participants were not coerced to participate in the study.

Based on the fact that this study is a multi-phased mixed research using multiple data approaches, care has been taken to discuss ethical measures related to each specific method used for each objective in chapters four, five, six, seven, eight and nine.

3.10 CHAPTER SUMMARY

This chapter provided a detailed account of the research design and methods applied in this study. The methods used were described in details in relation to the objectives of the study. A detailed account of the measures implemented to ensure good quality and a reliable research process have been described. The next four chapters: Four, Five, Six and Seven concern the specific research methods, results and discussion for each of the research objectives**.**

CHAPTER FOUR

PHASE ONE: RESULTS OF KNOWLEDGE AND PREVALENCE OF METABOLIC SYNDROME, QUALITY OF LIFE OF WOMEN WITH METS, FOCUS GROUP DISCUSSION AND INTEGRATIVE LITERATURE REVIEW

4.1 INTRODUCTION

Chapter four is divided into three sessions. In section A, the results of participants' knowledge and prevalence of MetS are described. The section also describes the correlation among demographics, knowledge of MetS and MetS predictors.

Section B also describes results of the quality of life (QOL) of women with MetS and a focus group discussion describing the women's informed views about practices and measures contributing to improved health outcomes. The correlation among QOL domains and MetS predictors are also described.

Section C, the final section in chapter four also describes an integrative literature review conducted to explore the documented MetS intervention programmes for promoting health in metabolic syndrome.

4.2 SECTION A

KNOWLEDGE AND PREVALENCE OF METABOLIC SYNDROME

This section describes the results of two quantitative surveys conducted with the aim of exploring the knowledge and prevalence of metabolic syndrome among market women in Kaneshie, Accra-Ghana. Although the knowledge and prevalence of MetS are two separate quantitative studies, the study population, sample size and sampling method, as well as the data collection process are the same. However, data collection instrument and data analysis were specific for each study.

4.2.1 METHODOLOGY

For the two quantitative studies, the systematic random sampling method was used to select a sample size of 348 (n = 348) plus 10% calculate which was calculated from a total number of 4032 women with permanent stalls trading at the Kaneshie market. A computer software programme (Raosoft, 2005: the calculator at www. raosoft.com) using a confidence

interval of 95%, taking into consideration a marginal error of 5% and a response distribution of 50% was used for calculating the sample size.

To explore participants' knowledge of MetS, See et al (2010)'s Knowledge of metabolic syndrome (K-MS) questionnaire was used for data collection (Appendix 4). The MetS status (prevalence of MetS) of participants was also assessed through anthropometric and physiologic measurements (Appendix 5). Data collection procedure, measures of instrument validity and reliability as well as procedure for data analysis for both studies, have been described in chapter three.

4.2.2 RESULTS AND FINDINGS

The results for studies one and two is divided into two sections. Section 4.2.2.1 is presentation of the results of the Knowledge survey. On the other hand, section 4.2.2.2 is the results of the prevalence survey. The results of the knowledge and prevalence of MetS, are presented in this section.

4.2.2.1 Results of Knowledge of MetS

This section presents results for participants' demographic data as well as their knowledge of metabolic syndrome.

4.2.2.1.1 Demographic Features

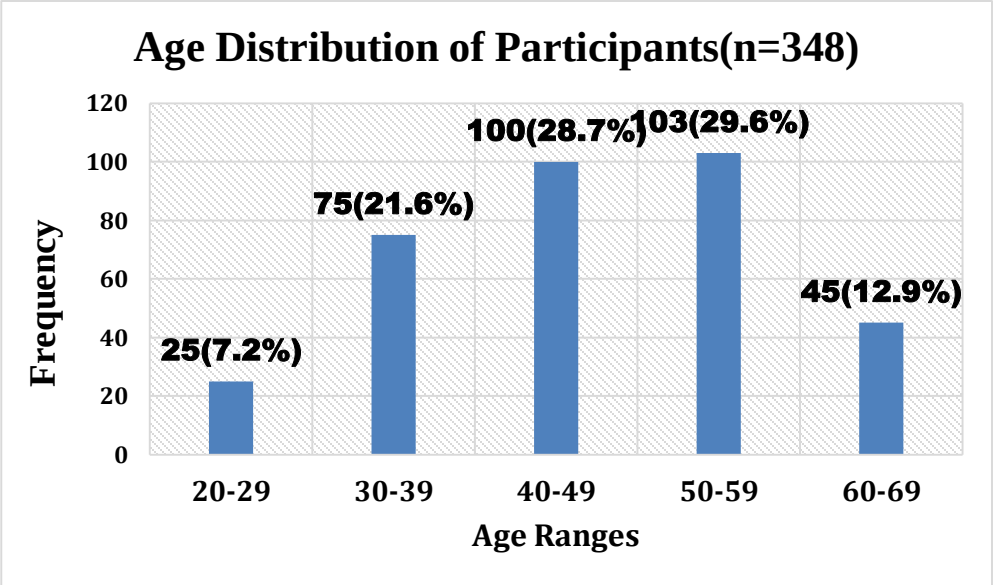
The demographic data of participants is presented on table 4.1. However, it has also been presented in diagrams on the subsequent pages. This comprises age, marital status, educational level, socio-cultural and religious affiliation, period of trading, diabetes and hypertension diagnosis, and whether those diagnosed with diabetes and /or hypertension were on any form of medication

Table 4. 1: Descriptive Analysis of Participants' Demographic data (%) (n=348)

	Description	Frequency (n) & Percentages%
Age	20-29	25(7.2)
	30-39	75(21.6)
	40-49	100(28.7)
	50-59	103(29.6)
	60-69	45(12.9)
Marital Status	Single	61(17.5)
	Married	183(52.6)
	Divorced	52(14.9)
	Widowed	52(14.9)
Educational level	Middle school	167(48.0)
	None	41(11.8)
	Primary	56(16.1)
	Secondary	72(20.7)
	Tertiary	12(3.4)
Socio-cultural	Akan	205(58.9)
	Ewe	18(5.2)
	Ga	95(27.3)
	Other	30(8.6)
Religion	Christian	332(95.4)
	Muslim	13(3.7)
	Traditional	3(0.9)
Period of trading	0.1 – 10years	108(31.0)
	11-20years	105(30.2)
	21-30years	105(30.2)
	31-40years	27(7.8)
	41-50	3(0.9)
Diabetes diagnosis	No	326(93.7)
	Yes	22(6.3)
Hypertension diagnosis	No	261(75.0)
	Yes	87(25.0)
On medication	No	14(12.8)
	Yes	95(87.2)

- **Age of Participants**

The age distribution of the participants was analyzed and represented in the figure 4.1 and 4.2. Twenty-five participants, 25(7.2%) were between the age ranges of 20-29years, 75



(21.6%) were between 30-39years, 100 (29.6%) were between 40-49years, 103 (29.6%) were between 50-59years, while 45 (12.9%) were between 60-69years.

Figure 4. 1: Age Distribution of Participants

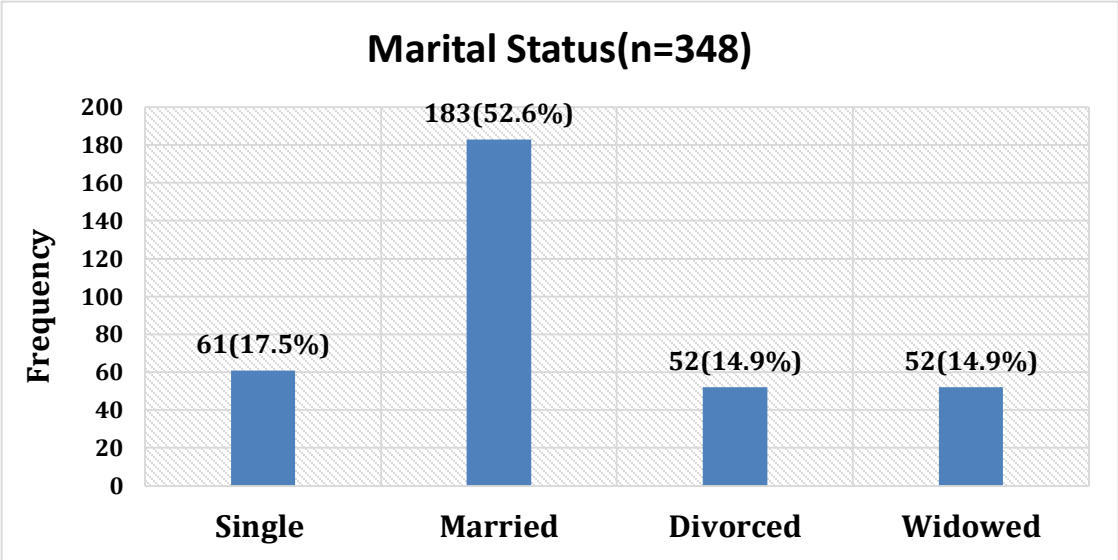


Figure 4. 2: Marital Status of Participants

- **Marital Status of Participants**

  Results of Figure 4.2 below, of the marital status distribution of participants revealed that out of the (n=348), a majority of 183 (52.6%) were married, 61 (17.5%) reported that they were single, 52 (14.9%) stated that they were divorced, while 52 (14.9%) averred that they were widowed. The high percentage of married participants is consistent with the situation in Ghana since all women aspire to get married. Furthermore, in Ghana, marriage is regarded as of high status and a symbol of happiness. Therefore, a market woman's marital status may influence her social life or quality of life. Spousal support may also enhance the adoption of positive lifestyle by these market women, preventing the incidence of MetS.

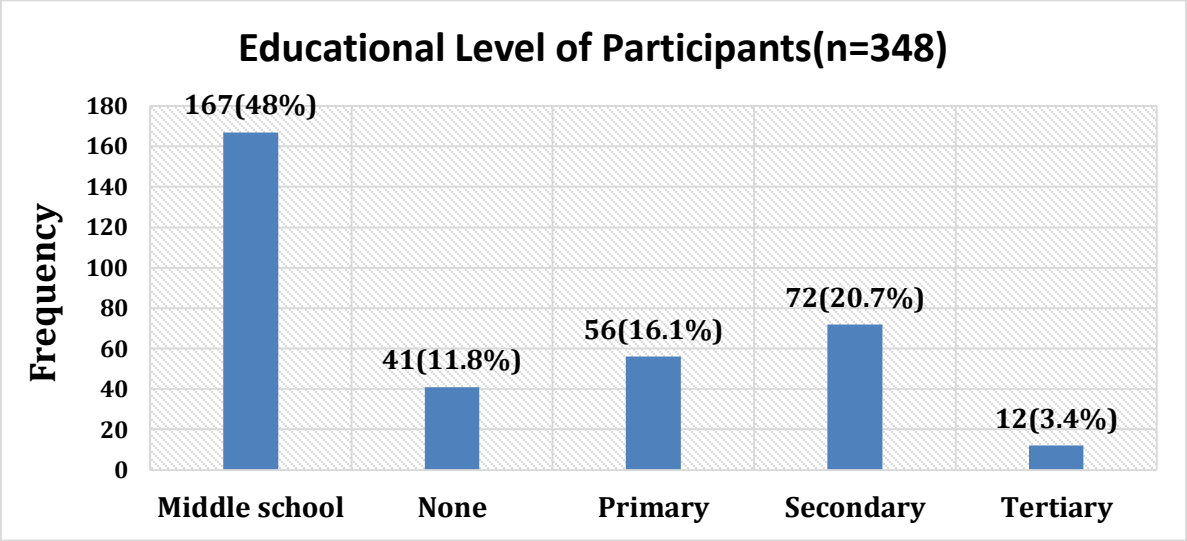


Figure 4. 3: Educational Level of participants

- **Educational Level**

  The results of the study in Figure 4.3 depict that a significant majority of 167 (48%) participants had received education up to the Middle School level, whiles 72 (20.7%) had education up to Secondary level. Furthermore, a significant minority of 56 (16.1%) were Primary level literates, whilst 41(11.8%) indicated that they had received no formal education at all. This means that 27.9% were functionally illiterates, and this may have influence on knowledge of nutritious diet, and willingness to adopt positive lifestyles. Only 12 (3.4%) were educated at the Tertiary level. The results generally suggest that the population was moderately a literate populace. This is accounted for as 307(88.2%) of the study population.

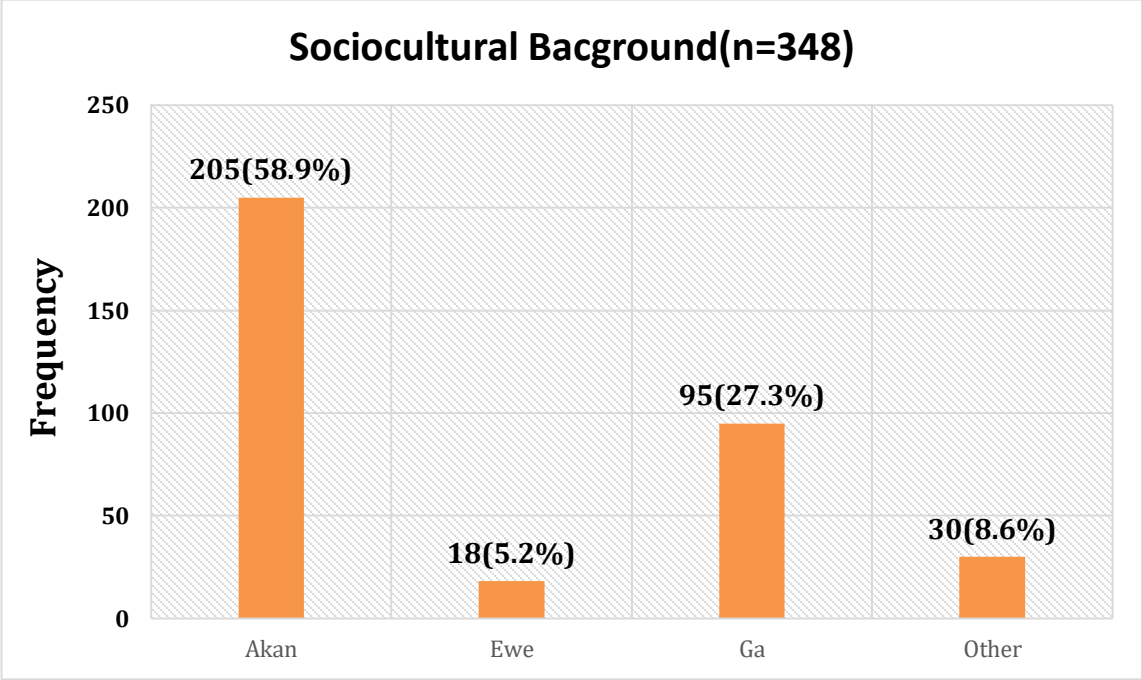


Figure 4. 4 : Sociocultural Background

- **Socio-Cultural Background**

  More than half of the participants who were involved in the study were Akans. This is represented by 250 (59%), 95 (27%) were Gas, 18 (5%) were Ewes, while 30 (9%) were of other socio-cultural background as indicated in Figure 4.4. The large numbers of the Akans may be attributed to the fact that the Ghanaian population is dominated by Akans.

  In Ghana, one's sociocultural background or tribe has a great influence on his or her perception of health and health seeking behaviors. The food types consumed by some tribes predispose them to obesity and MetS. Some Ghanaian tribes have various myths and cultural beliefs about certain types of foods and this may influence their knowledge on choice of nutrition and health practices.

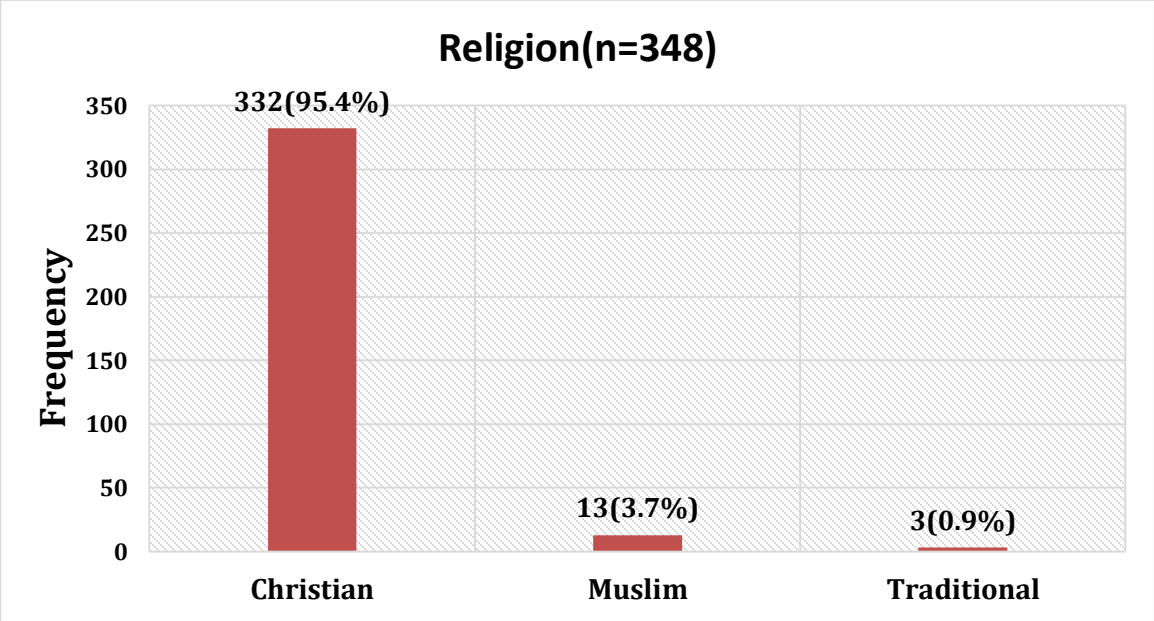


Figure 4. 5: Religious Affiliation of Participants

- **Religious Affiliation of Participants**

  A vast majority of 332 (95.4%) participants belonged to the Christian religion. Muslims accounted for 13 participants (3.7%), whilst the remaining 3(0.9%) indicated that they were associated to the Ghanaian Traditional religion. This result stems from the fact that Ghanaians are predominantly Christians (over 80 percent of Ghanaians are said to be Christians) even though there are other forms of religions in the country. In Ghana, religious affiliation greatly has an impact on food choices. For instance, people associated with the traditional religion mostly have different beliefs and practices as regards food and nutrition, and this may influence their knowledge of nutritious diet and readiness to adopt teachings on diet and nutrition.

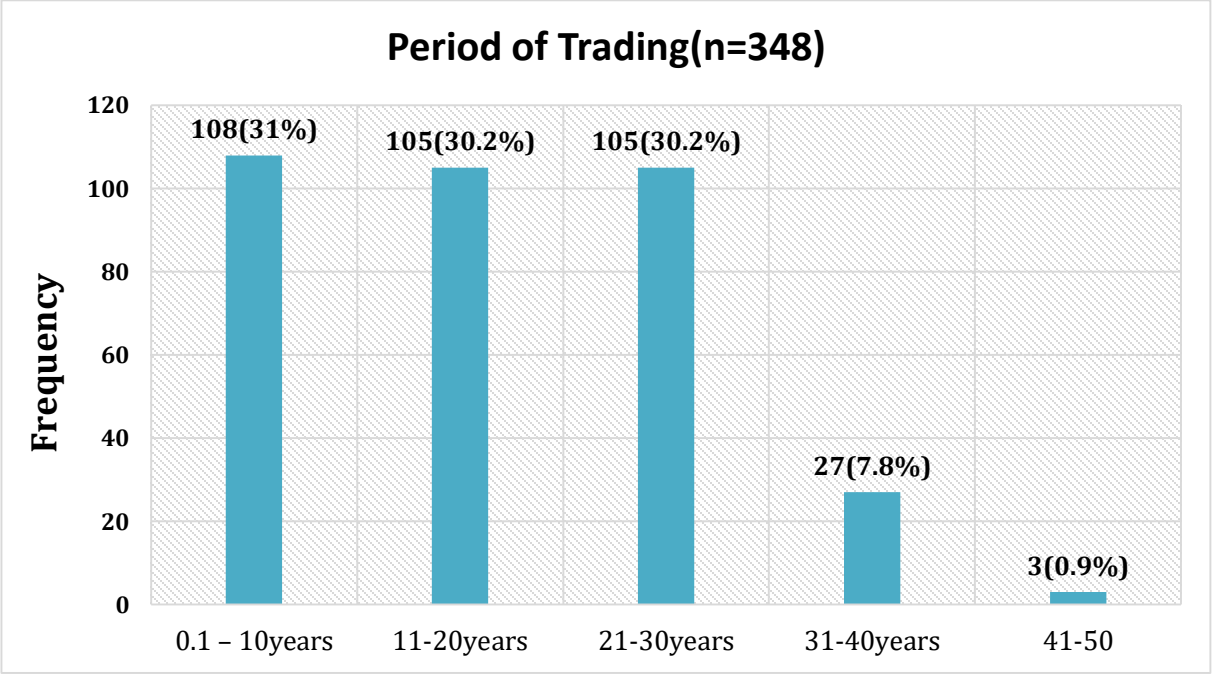


Figure 4. 6: Period of Trading

- **Period of Trading**

  The result of the study as shown in Figure 4.6 below revealed that participants trading at the Kaneshie Market Complex had worked for a maximum of 47 years as market women and a minimum of 1 year with a mean year of 18.48. It can therefore be concluded that these women were experienced and typical Ghanaian market women who had been involved in trading activities for quite some time and this may be indicative of a prolonged sedentary lifestyle which predisposes them to MetS.

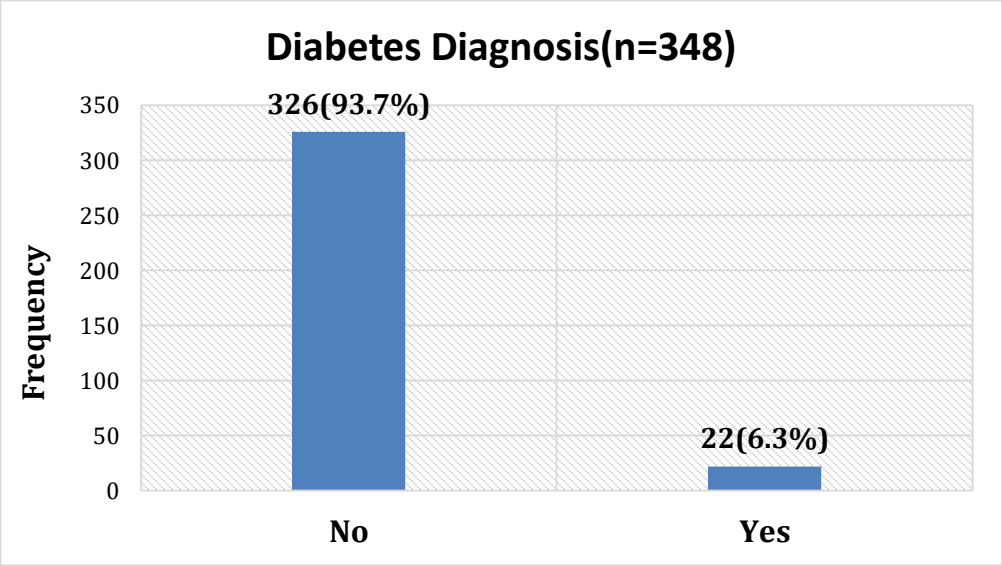


Figure 4. 7: Diabetes Diagnosis

- **Diabetes Diagnosis**

  In Figure 4.7, the distribution of participants' diagnosis of diabetes as depicted was established where a majority of the participants who took part in the study 326 (93.7%) indicated that, they had never been diagnosed of diabetes. However, 22(6.3%) stated they had been diagnosed of diabetes.

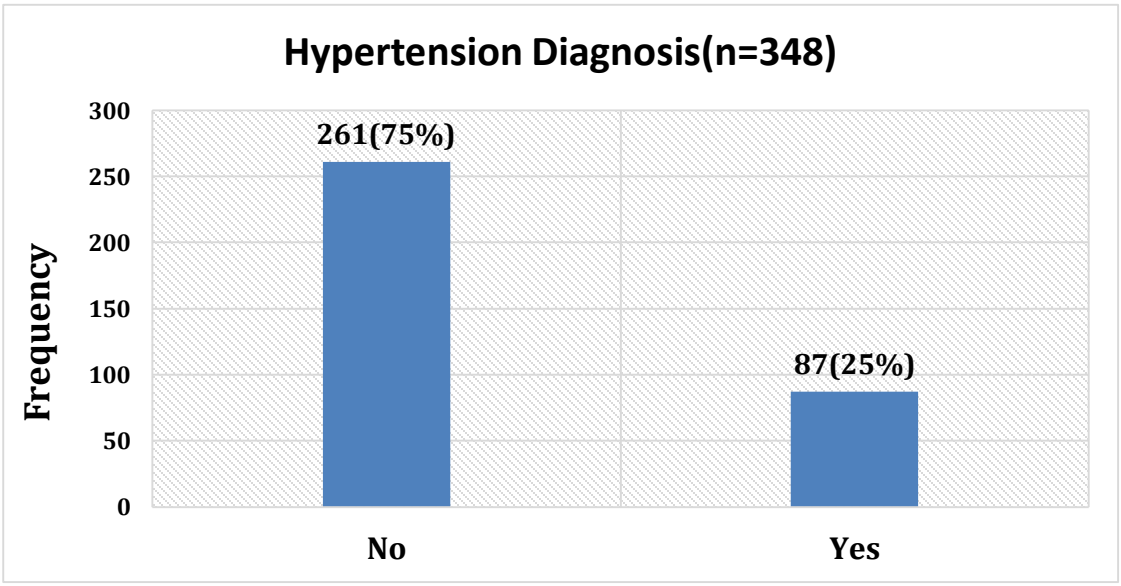


Figure 4. 8: Hypertension Diagnosis

- **Hypertension Diagnosis**

The distribution for hypertension diagnosis showed in figure 4.8 indicated a majority of 261 (75%) participants stated they had never been diagnosed of hypertension, while 87 (25%) reported they had been diagnosed as having hypertension. Again, this result indicates that a few of the market women at the Kaneshie Market Complex were known hypertensives.

Results from Figures 4.7 and 4.8 above depicts that a total of 109(31.3%) of the participants for this study, were known diabetics and hypertensives. This means that there are risk factors or consequences of sedentary lifestyle of these market women that need to be addressed to ensure improved health outcomes.

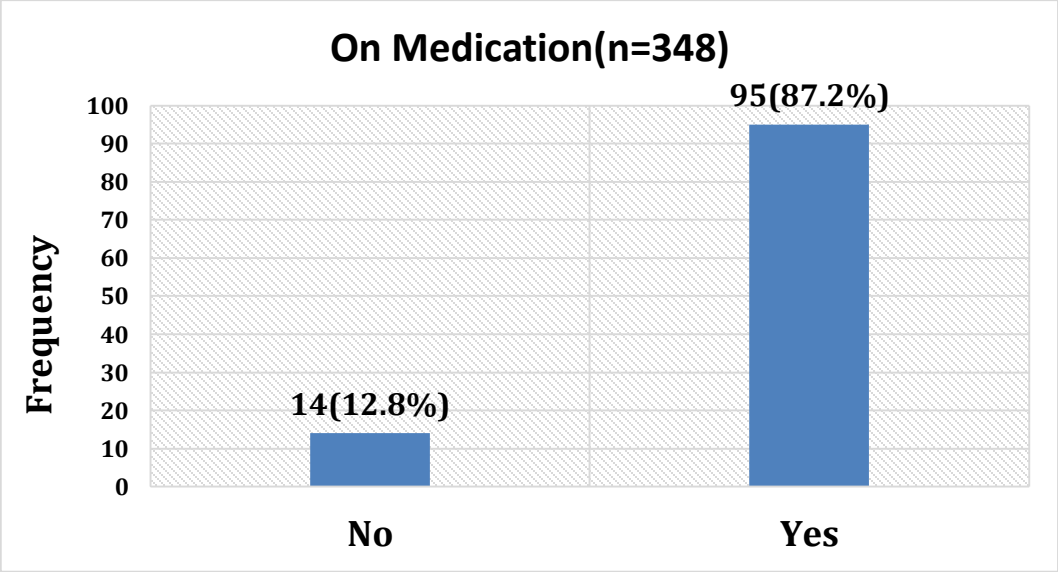


Figure 4. 9: Participants who were on Medication

- **On Medication**

Results from figure 4.9 indicate that out of 109(31.3%) participants who had either been diagnosed with hypertension or diabetes, 95(87.2%) were on one form of medication for the treatment of their condition(s). A vast majority of 21(95.5%) out of the 22 participants who were known diabetics, stated they were on medication, while 74(85.1%) out of those who were known hypertensives also stated they were on medication. The remaining 14(12.8%) however stated they were not on any form of medical treatment despite being diagnosed of these two conditions.

Participants who were known diabetics and hypertensives but stated they were not on any medications revealed that they stopped taking the medications after their initial diagnosis and treatment. Some of these participants gave various reasons for their non-adherence to these treatments which included; the side effects of the medications, some also resorted to traditional and herbal medications as well as spiritual treatment.

4.2.2.1.2 Knowledge of Metabolic Syndrome Prevention (n=348)

Table 4.2 depicts participants' knowledge about metabolic syndrome. Nine questions were asked all the (n=348) participants in the study, to understand the knowledge they had about MetS

Table 4. 2: Knowledge of Metabolic Syndrome Prevention. Frequency & Percentages (%) (n=348)

Question number	Question	Correct	Incorrect
Question 1	Which of the following is not a risk factor for heart disease and stroke (MetS)?	44 (12.6)	304(87.4)
Question 2	Which of the following best describes a woman's waist too big?	9 (2.6)	339(97.4
Question 3	Which best describes "High Blood Pressure"?	21(6.0)	327(94.0)
Question 4	Which best describes the criteria for "High Fasting Blood Sugar?"	3(0.9)	345(99.1)
-Question 5	Which of the following is not directly related to *"Waist is too big (abdominal obesity)"?*	224(64.4)	124(35.6)
Question 6	What are the complications that result from suffering heart and blood vessel diseases (MetS)?	57(16.4)	291(83.6)
Question 7	What habits lead to the risk of developing heart diseases, high blood cholesterol, high blood sugar and high blood pressure (MetS)?	319(91.7)	29(8.3)
Question 8	Which of the following is not a self-care way to prevent heart diseases, high blood pressure, high blood sugar, dyslipidemia and abdominal obesity (MetS)?	281(80.7)	67(19.3)
Question 9	Which is not true in the medical treatment or care for people with heart diseases, high blood sugar, high blood pressure, high blood cholesterol and abdominal obesity (MetS)?	326(93.7)	22(6.3)
Total knowledge score	Above 50%	68(19.5)	
	Below 50%	280(80.5)	

Participants were asked in question one to identify amongst various possible answers, which was not a risk factor for heart disease and stroke. The results showed that majority of 304 (87.4%) gave incorrect responses while only 44 (12.6%) out of the total 348 were able to answer correctly.

Secondly, 339 (97.4%) answered incorrectly to the second question ‘’which best describes a woman’s waist too big’’. However, 9 (2.6%) were able to answer it correctly.

The results of the test on the knowledge of MetS among the market women for question three depict that a significant majority of 327 (93.9%) stated that they did not know what was best described as “High Blood Pressure” and so answered incorrectly. Only 21(6.1%) answered this question correctly.

The study also found that a vast majority of 345(99.1%) answered incorrectly to the knowledge question of what best described the criteria for “High Fasting Blood Sugar” (FBS). The remaining 3(0.9%) however were able to answer correctly. This suggested that participants were not informed about the criteria which related to or best described FBS.

Again, the results of the fifth knowledge question asked as represented in table 2 above revealed that a majority of 222 (64.3%) answered correctly to the question “which of the following is not directly related to "Waist is too big (abdominal obesity)", while the remaining 124(35.7%) participants gave incorrect answers to the question.

Furthermore, in question six when participants were asked about complications that resulted from suffering heart and blood vessel diseases, only 57(16.4%) out of 348 knew the correct answer as “stoke”. A significant majority of 291(84.6) were unable to identify the correct answer. This suggested that participants had minimal knowledge and awareness of the complications which resulted from heart and blood vessel diseases or metabolic syndrome.

In addition to that, a critical look at Table 4.2 again revealed that, the analysis of the seventh question; ‘’Which of the following habits lead to the risk of developing heart diseases, high blood sugar, high blood pressure and high blood cholesterol (MetS)’’ indicate that

participants' knowledge about this question was appreciative as a significant majority of 319(91.6%) were able to answer correctly, while a minority of 29 (8.4%) answered incorrectly.

Participants were again asked in question eight to select what was not a self-care way to prevent heart diseases, high blood pressure, high blood sugar and cholesterol and abdominal obesity (metabolic syndrome). Majority 281(80.7%) knew the correct answer while 67 (19.3%) answered incorrectly to the question.

Finally, participants were asked to indicate what was not true in the medical treatment or care for people with heart diseases, high blood sugar, high blood pressure and high blood cholesterol (metabolic syndrome). A significant majority of 326(93.7%) provided the correct response. Contrary to the view of those who answered correctly, 22(6.3%) did not have knowledge about the medical treatment of MetS.

- **Descriptive Analysis for Knowledge of Metabolic Syndrome**

  The results indicate that, the minimum knowledge score of participants was 0%, the maximum was 78%, with a mean of 41 and standard deviation of 13.5.

- **Total Knowledge Score of Participants**

  An overall assessment of the participants' knowledge on MetS was conducted, and the analysis revealed that only 68(19.5%) who had adequate knowledge of metabolic syndrome and therefore scored above 50%, while a vast majority of 280 (80.5%) basically did not have adequate knowledge on metabolic syndrome and therefore scored below 50%.

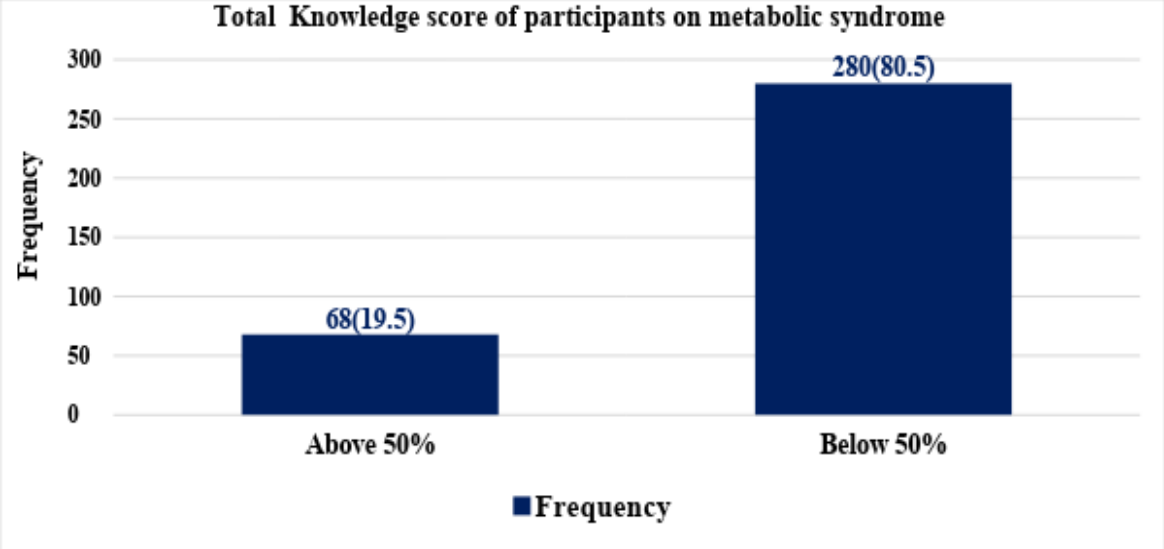


Figure 4. 10: Total Knowledge Score of Participants

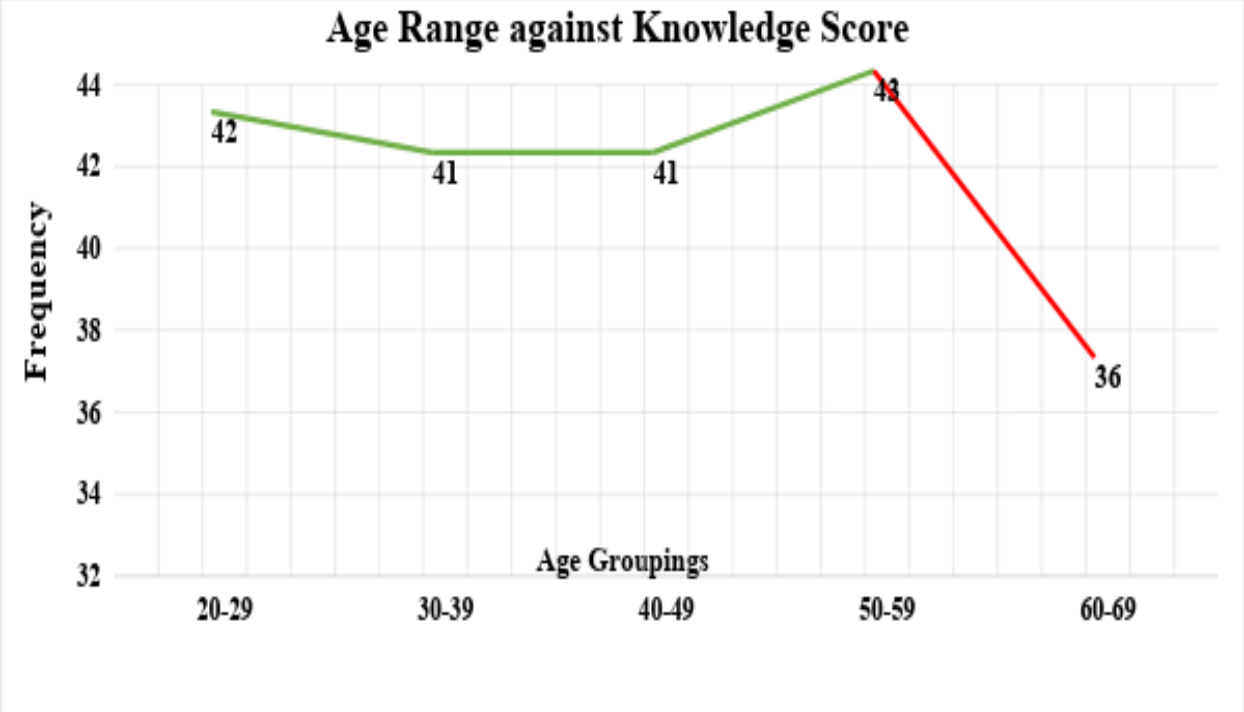


Figure 4. 11: Age Range against Knowledge Score

The minimum age of participants was 25years, the maximum was 65years, while the mean age was 46years

Figure 4.11 above depicts that the 20-29years age group had a knowledge score of 42%, the 30-39years group had a knowledge score of 41%, while the knowledge score of the 40-

49years group was 41%. The 50-59years group recorded the peak knowledge score of 43%, while the 60-69years group recorded the lowest knowledge score of 36%.

4.2.2.1.3 DISCUSSION OF FINDINGS

This section focuses on discussion of findings of the market women's knowledge of MetS from the analysis of this study. It highlights participants' knowledge about the risk factors of MetS, MetS indicators, complications, prevention and treatment of MetS, as well as their overall knowledge about MetS as compared to other studies.

- **Knowledge of Metabolic Syndrome**

  Research shows that patients' knowledge, attitudes, and behavior play a large role in preventing and managing the risk factors making up metabolic syndrome, however among the general population especially in the developing world, a lot of people are unaware of this concept (Joshi et al 2013).

- **Risk factors for Metabolic Syndrome**

  Findings from this study reveals that participants exhibited poor knowledge about metabolic syndrome, and its associated risk factors. From the results, only 12.6% knew about the risk factors for heart diseases and stroke (MetS). A vast majority of 87.4% did not know the risk factors for metabolic syndrome. This result confirms Lewis et al (2008) in Gyakobo et al (2012)'s assertion that, in Africa, the general population has poor knowledge of MetS. Similarly, Joshi et al (2013) further revealed in their study that, only 10% of their research participants perceived lifestyle behaviors as a risk factor for acquiring MetS. They further indicated that, difficulty in understanding healthcare information was commonly reported, especially in rural and slum settings. However, unlike the current study which was done among market women in an urban city of Ghana, Joshi et al (2013)'s study was done among people living in Urban, rural and slum areas. The researcher in the current study upon interaction with the market women observed that generally there was lack of knowledge about MetS, participants revealed they had never heard about metabolic syndrome although they knew about non-communicable diseases like hypertension and diabetes. This can be attributed to the fact that, in Ghana health promotional activities and

public education is mostly centered on diabetes Mellitus and hypertension as well as HIV/AIDS, Hepatitis and Malaria.

- **Metabolic Syndrome Indicators**

  The results in this study further revealed that an inordinate number of participants did not know the components or indicators for metabolic syndrome. Only 2.6% knew about the normal waist circumference for an adult female, and only a minority of 3.9% were able to identify the normal blood pressure value or range for an adult, while only 0.9% knew the normal fasting blood sugar level. This implies that participants had poor knowledge about the components and normal values or ranges for MetS predictors, although some of them were known diabetics and hypertensives. This finding may be linked to the fact that in Ghana, the focus of health education is mostly on preventive measures and treatment, rather than causes, clinical manifestations and complications. This result is consistent with Marwa, Latifa, and Amnah (2016)'s study which revealed that, lower scores were observed in the participants' knowledge about manifestations of metabolic syndrome notwithstanding the fact that their study was done among college students. Similar to this results, Wang et al (2019) also revealed that the average Metabolic syndrome knowledge score (MSKS) was found to be very low (mean = 36.7±18.8), indicating that participants had poor knowledge about MetS hence the researchers averred that there is the urgent need for MetS education in current practice.

- **Complications of Metabolic Syndrome**

  Results from the analysis of this study also revealed that participants lacked knowledge about the complications of metabolic syndrome. Only a minority of 16.4% were able to identify the complications associated with metabolic syndrome. The remaining 84.6% however, were unable to give the correct answer. On the contrary, Yahia et al (2014) found out in their study that more than 80% of participants correctly identified symptoms and complications of MetS. Yahia et al (2014)'s results may be attributed to the fact that their subjects were university students who were all literates compared to the subjects (market women) recruited for the current study who were predominantly semi-literates. The findings of the current study also is in line with Marwa et al's (2016) study which further

revealed that participants had lower scores in identifying the complications associated with metabolic syndrome, although their study was also done among college students.

- **Prevention and Treatment of Metabolic Syndrome**

  This study again revealed that participants were knowledgeable about lifestyle changes that could prevent metabolic syndrome. A vast number of participants, 80.7% were able to answer correctly when asked about the preventive measures of MetS, as against 19.3% who answered wrongly. Concerning the measures of medical treatment for MetS, participants had knowledge on some facts about the medical treatment of MetS as a greater majority of them 93.7% were able to answer correctly, while only a minority of 6.3% were said to be unaware about the medical treatment of MetS and hence gave incorrect answers.

  Contrary to this finding, Marwa et al (2016) found out in their study that participants had lower scores concerning their knowledge about the treatment of MetS. Similarly, Amarasekara et al (2016) further identified in their study that despite regular attendance at medical clinics after the diagnosis of Non-Communicable Diseases such as diabetes, hypertension, and/or dyslipidemia their participants failed to gain knowledge on important aspects of controlling the components of MetS, such as diet, exercise, smoking, and adherence to healthy lifestyle habits. In line with Amarasekara et al (2016), Joshi et al (2013) also found significant disparities in responses about the use of diet and exercise as means to manage their MetS among urban, rural, and slum individuals.

  The results of the current study about the market women's knowledge on the treatment and prevention of MetS may stem from the fact that some participants confirmed having heard some form of education on diabetes and hypertension through the radio which they linked to MetS. They however stated they had never had any education on MetS specifically.

- **Total Knowledge Score of Participants**

  Analysis of the total knowledge score of participants in this study revealed that, a significant majority of 80.5% scored below 50 out of 100 while only 19.5% scored above 50. The lowest K-MS score was 0%, the maximum score was 78%, with a mean score and standard deviation of 41 and 13.5 respectively. This is indicative that the general population

used for this study basically had little knowledge on metabolic syndrome and its complications and this poses more alarm. This finding is consistent with Lo et al (2016) whose results also revealed that the mean K-MS score was 44.9 out of 100; most participants (61%) scored below 50, indicating a poor level of MS knowledge. Conversely, Amarasekara, et al (2016) revealed in their study conducted in Sri-Lanka that patients with MetS had a moderate mean level of knowledge and practices and high attitude toward CVD risk reduction, although knowledge and practice in some specific areas were low.

Lo et al (2016) further found out in their study that, participants who were older, scored the lowest in terms of knowledge regarding Metabolic Syndrome. In contrast, the current study revealed that participants who were between the ages of 50-59 had the highest score (43%) compared to (42%) scored by the 20-29year group as regards the knowledge of MetS. Hence it can be stated that the knowledge of MetS among participants in the current study had no link with their age.

In conclusion, the current study revealed that the market women had poor knowledge about MetS. The lack of knowledge about metabolic syndrome and its associated complications among the market women used for this study could be attributed to lack of or inadequate education of the general public in the Ghanaian society about metabolic syndrome. It can therefore be concluded that there is a need to educate market women as well as members of the public on Metabolic Syndrome.

Other researchers had also proposed the need for creating awareness about metabolic syndrome since there is generally poor knowledge of MetS. Marwa et al (2016) in their study concluded that, knowledge and awareness about Metabolic Syndrome should be improved in order to promote a healthy lifestyle and to prevent MetS and its associated complications. Again Tsou (2017) also asserted that, there should be the development of health education programs that could enhance the prevention and self-monitoring for MetS.

To buttress this, Cortez et al (2018) also stressed that educational intervention is very necessary in addressing the MetS menace as education promotes increased knowledge and stimulates changes in attitudes related to risk factors associated with MetS. In support of this, Yahia, Brown, Rappley, and Chung (2014) also suggested that knowledge about

conditions relevant to metabolic syndrome could be improved through raising awareness about MetS based on pre-existing knowledge. Education can therefore play a vital role in curbing this menace of metabolic syndrome.

In conclusion, analysis of the total knowledge score of participants in this study revealed that, only 68(19.5%) had adequate knowledge of MetS and therefore scored above 50% of the total knowledge score. A significant majority's level of knowledge was below 50%. The results further showed that the 50-59 years group recorded the highest knowledge of MetS score (43%), while the 60-69 years recorded the lowest knowledge score of 36%. The results reveal the importance of educating the older generation (60-69) with knowledge of MetS since MetS was also common among this age group. Furthermore, a vast majority (87.4%) did not know the factors associated with MetS as well as the indicators and complications. Interestingly, a huge number of participants, 80.7% were able to answer correctly when asked about the preventive measures.

4.2.2.2 Results for Prevalence of Mets

The presented results in this section of the MetS prevalence were based on the total sample of (n=348). The results of the general prevalence distribution of all the participants that includes: Age group, Metabolic Syndrome (MetS) status, Waist Circumference (WC), High Density Lipoprotein (HDL), Triglycerides (TGL), Fasting Blood Sugar (FBS), Body Mass Index (BMI), and Blood Pressure (BP) are presented as indicated in Table 4.5.

Table 4. 3: Prevalence Data of Participants (n=348)

Variables	Description	Frequency (n=348) & Percentage (100%)
Age group	20-29	25(7.2)
	30-39	75(21.6)
	40-49	100(28.7)
	50-59	103(29.6)
	60-69	45(12.9)
MS	At risk	168(48.3)
	Negative	80(23)
	Positive	100(28.7)
WC	High	236(67.8)
	Normal	112 (32.2)
HDL	Normal	113(32.5)
	Abnormal	235(67.5)
TGL	High	10(2.9)
	Normal	338(67.5)
FBS	High	78(22.4)
	Normal	270(77.6)
BMI	Normal	67(19.3)
	Obese	174(50)
	Overweight	107(30.7)
BP	High	124(35.6)
	Low	99(28.4)
	Normal	125(36)

4.2.2.2.1 Age Distribution of Participants

The age distribution of participants presented in Table 4.3 depicts that 25(7.2%) were within 20-29years, 75(21.6%) were within 30-39years, 100(29.6%) were within 40-49years, 103(28.7%) were within 50-59 years, while 45(12.9%) were within the age group of 60-69years. Studies show that MetS increases with age (Okafor, 2012)

4.2.2.2.2 Prevalence Data for Metabolic Syndrome among Participants (n=348)

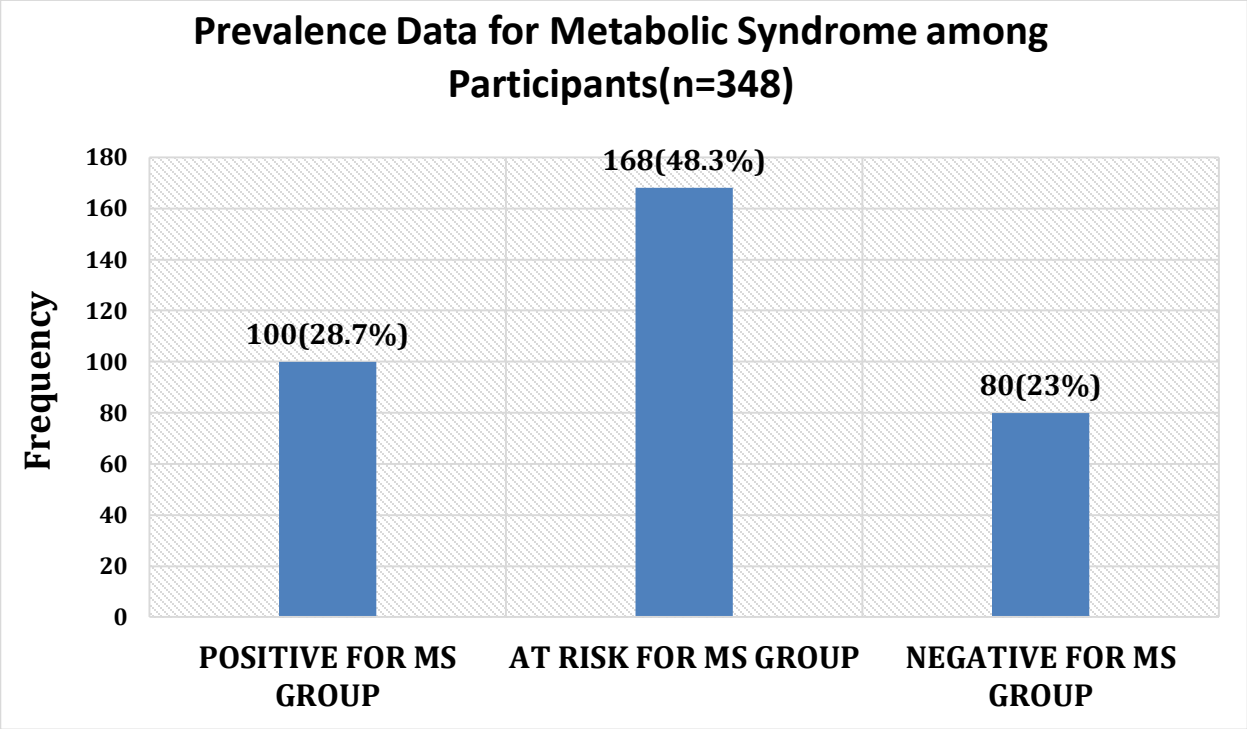


Figure 4. 12: Prevalence of MetS among Participants

Figure 4.12 above presents the prevalence of metabolic syndrome among the 348 participants who were involved in the study. The data analysis revealed that 100 (28.7%) out of 348 tested positive for metabolic syndrome, 168 (48.3%) were identified to be at risk for developing metabolic syndrome while 80 (23%) tested negative as per the IDF criterion for metabolic syndrome.

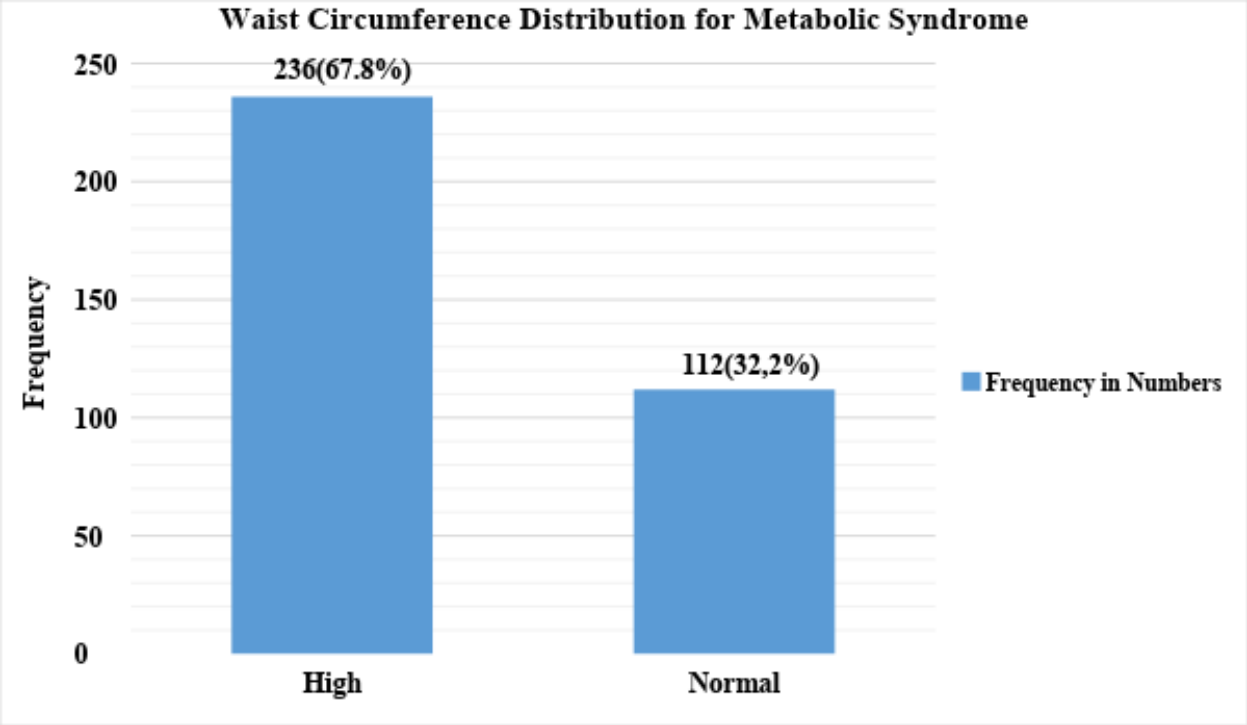


Figure 4. 13: Waist Circumference Distribution for MetS

Figure 4.13 clearly outlines the prevalence of waist circumference as an indicator for metabolic syndrome among the total participants. Majority representing 235(67.5%) had abnormally high waist circumference as against 112 (32.2%) who had normal waist circumferences.

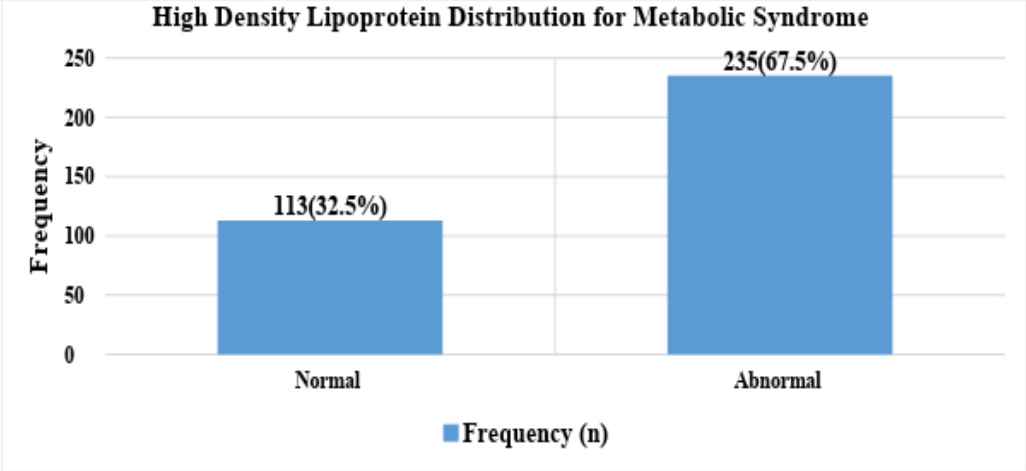


Figure 4. 14: High Density Lipoprotein Distribution for Metabolic

From the statistical analysis, it was revealed that a majority of 235(67.5%) had abnormal High Density Lipoprotein (HDL) levels compared with the remaining 113 (32.5%) who had normal High-Density Lipoprotein (HDL) levels.

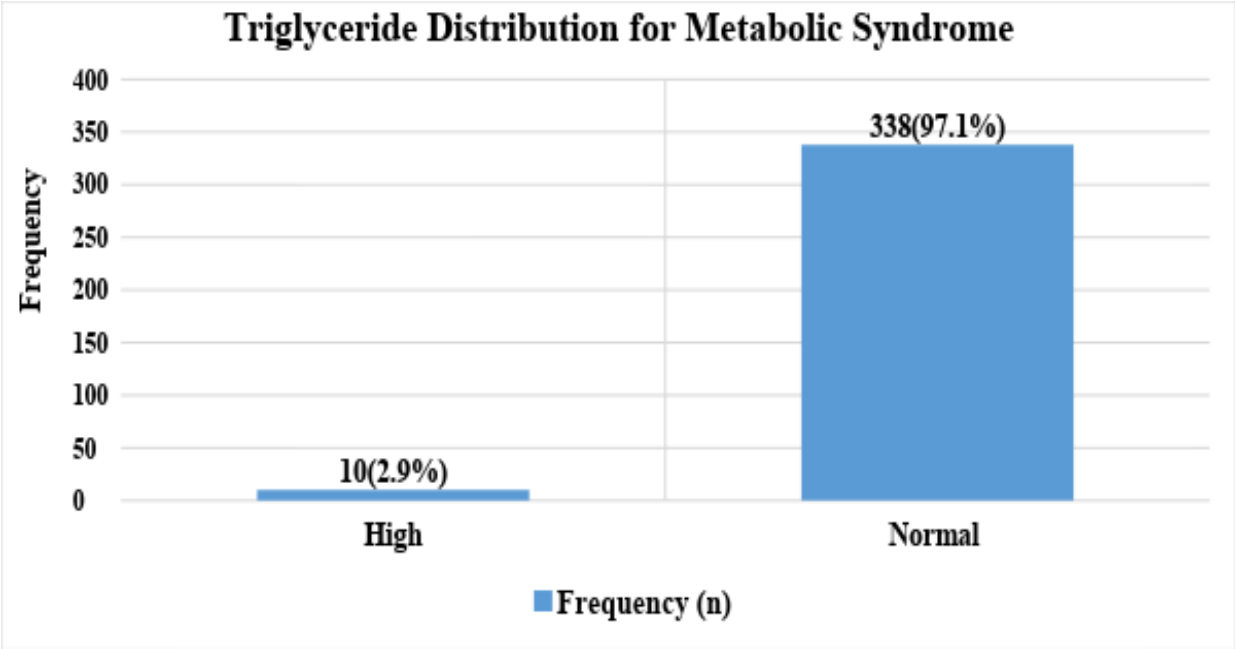


Figure 4. 15: Triglyceride Distribution for Metabolic Syndrome

The analysis of data gathered on Triglycerides (TGL) revealed that majority of the study participants 338 (97.1%) had normal levels of TGL in their blood stream while just a few recorded higher levels of TGL in their blood stream 10 (2.9%).

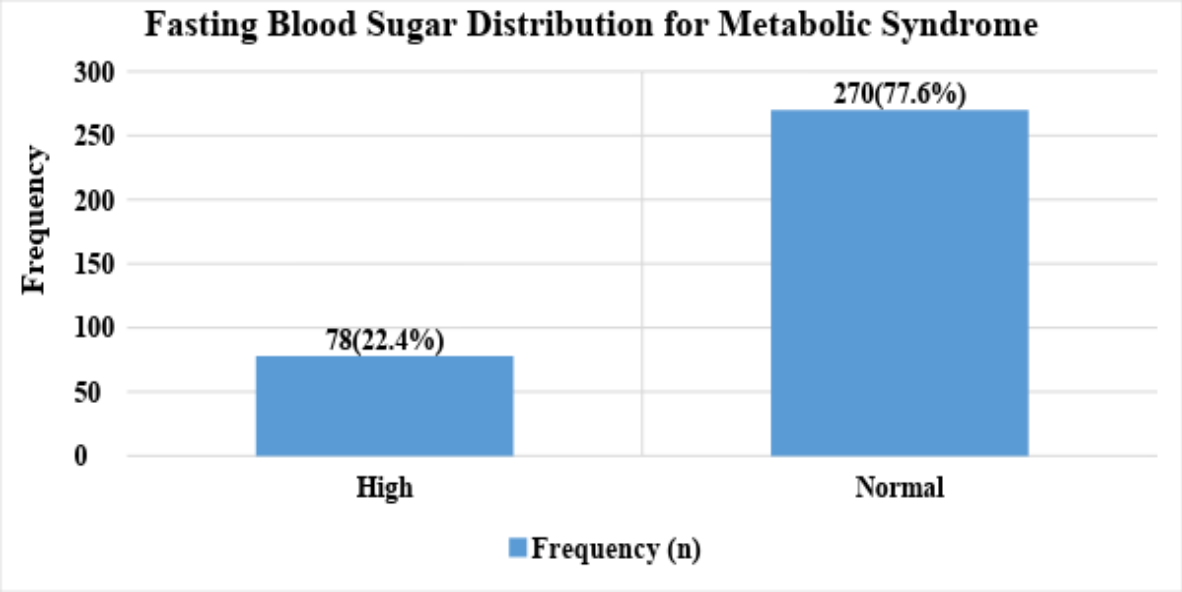


Figure 4. 16: Fasting Blood Sugar Distribution for Metabolic Syndrome

The distribution of data gathered for Fasting Blood Sugar (FBS) as shown in figure 4.16 above revealed that only 78(22.4%) participants had high FBS whiles over half 270 (77.6%) had normal values of FBS.

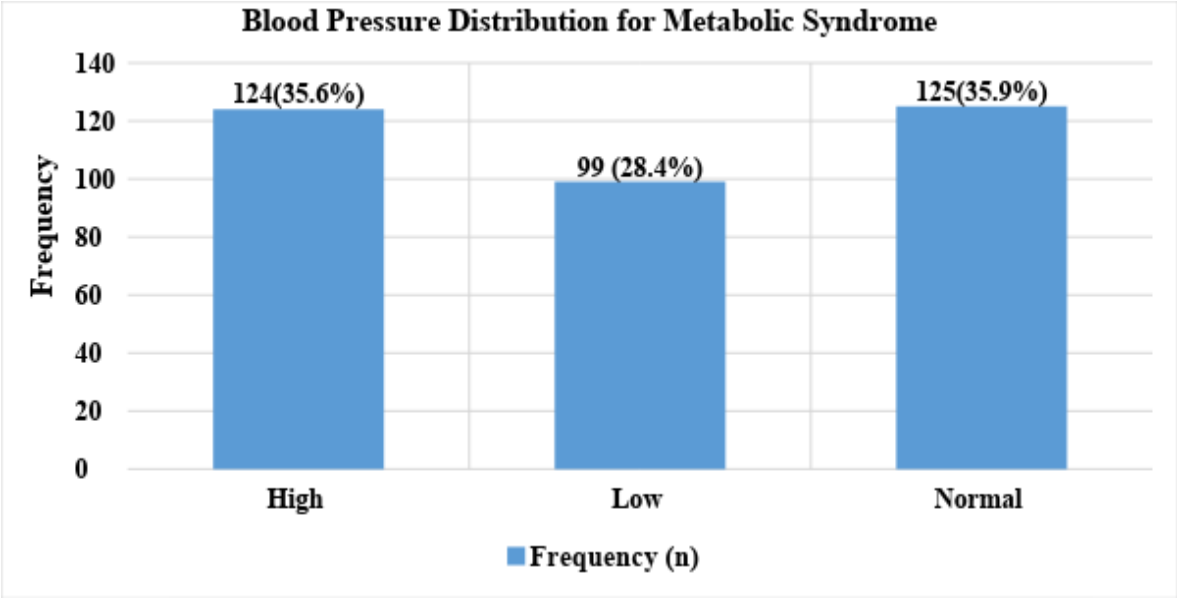


Figure 4. 17: Blood Pressure Distribution for Metabolic Syndrome

Figure 4.17 above further illustrates the analysis of data gathered on the Blood Pressure (BP) of participants. A majority of 125(35.9%) involved in the study had normal BP levels, while a significant number of 124(35.6%) also had high blood pressure level. However, 99(28.4%) had low BP.

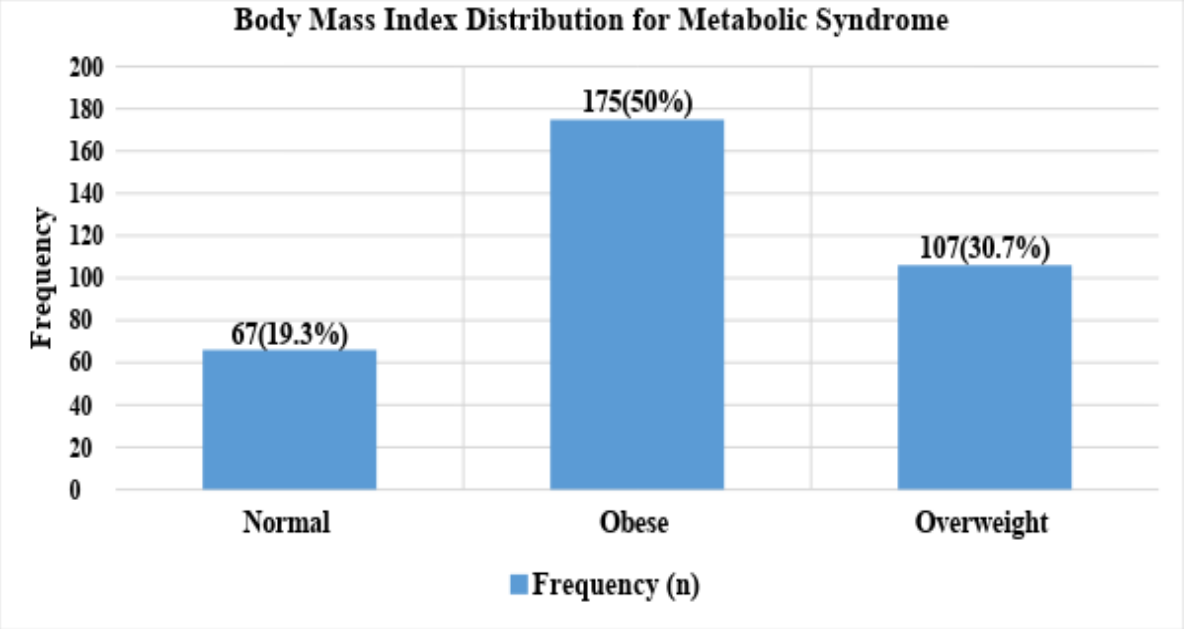


Figure 4. 18: Body Mass Index Distribution for Metabolic syndrome

With respect to Body Mass Index (BMI), a vast majority of the participants 174 (50%) were found to be obese based on WHO indicators for obesity with their BMI values exceeding 30kg/m2. Hundred participants (30.7%) had their BMI values ranging between 25-30kg/m^2 hence, were classified as being overweight while only 67(19.3%) had normal BMI values with no one falling below 19kg/m^2.

RELATIONSHIP BETWEEN VARIABLE DISTRIBUTIONS FOR THE TOTAL SAMPLE

Table 4. 4 Age Distribution of Participants by BMI (n=348)

	BMI			**TOTAL**
Age group	**Normal**	**Obese**	**Overweight**	
20-29	11	9	5	25
30-39	22	30	23	75
40-49	13	49	38	100
50-59	15	58	30	103
60-69	6	28	11	45
Total	67	174	107	348

The results of the study brought to light the fact that a large number of participants within the age category of 50-59 had unfavorable BMI parameters. A total of 88 (85.4%) out of 103 within this age group, were either obese or overweight. This was followed by those within the age group of 40-49 87(87.0%). While those within the age group of 30-39years recorded the highest normal readings of 22(32.8%) with respect to the BMI parameters.

Table 4. 5: Age Distribution by Metabolic Status

Age group	**Metabolic Status**			
	At risk	**Negative**	**Positive**	**Total**
20-29	10	12	3	**25**
30-39	37	32	6	**75**
40-49	51	19	30	**100**
50-59	45	14	44	**103**
60-69	25	3	17	**45**
Total	**168**	**80**	**100**	**348**

Participants' metabolic syndrome status in Table 4.5 showed that majority of them, 168(48.3%) were at risk for Metabolic Syndrome, 100 (28.7%) tested positive for Metabolic Syndrome, while 80(23%) were negative based on IDF criteria for MetS. From the analysis, the 50-59years age group recorded the peak value for positive participants 44(44%), the 40-49years group recorded the peak value for participants who were at risk (30.4%), while the 30-39 years recorded the peak value for those who were negative (40%).

Table 4. 6: BMI Distribution by Metabolic Status (n=348)

	Metabolic Syndrome Status			
BMI	**At risk**	**Negative**	**Positive**	**Total**
Normal	20	42	4	**66**
Obese	99	1	75	**175**
Overweight	49	37	21	**106**
Total	**168**	**80**	**100**	**348**

The cross tabulation of BMI and MetS shown in Table 4.6 revealed that the positive for MetS group recorded the peak values in terms of obesity. It was revealed that 75(75%) out of the total distribution positive for Metabolic Syndrome were obese, 21(21%) were overweight, while only 4(4%) had normal BMI. The study also revealed that 99(58.9%) of the at-risk group were found to be in the obese category from the distribution. 49 (29.2%), were overweight, while only 20(11.9%) had normal BMI. The distribution further depicts that participants who tested negative for MetS, recorded the peak values in terms of the overweight, and the Normal BMI categories representing 46.2% and 52.5% respectively. Only 1 (1.3%) of those who tested negative for MetS was found to be obese.

Table 4. 7: Age Distribution by Metabolic Variables

AGE P	WC		HDL		TGL		FBS		BP			BMI		
Age	High	Normal	Abnormal	normal	High	Normal	high	Normal	high	low	normal	Normal	overweight	obese
20-29	8	17	18	7	1	24	4	21	3	11	11	11	5	9
30-39	40	35	65	10	0	75	6	69	7	42	26	22	23	30
40-49	69	31	68	32	3	97	26	74	35	23	42	13	38	49
50-59	81	22	59	44	3	100	30	73	51	19	33	15	30	58
60-69	37	8	25	20	3	42	12	33	28	4	13	6	11	28
	235	113	235	113	10	338	78	270	124	99	125	67	107	174
	348		348		348		348		348			348		

From Table 4.7, a significant number of the participants representing 235 (67.5%) had abnormal WC levels irrespective of their age distribution. The distribution depicts that the WC increased with age after 30years. Secondly, a majority, 235(67.5%) had abnormal HDL levels irrespective of their age distribution. On the other hand, a majority of 338(97.1%) had normal TGL levels irrespective of their age distribution. From the analysis, it was again revealed that another significant majority of 270(77.6%) recorded normal FBS irrespective of their age group distribution. For blood pressure, 124(35.6%) had high blood pressure. Majority of those who fell within the age bracket of 20-39years recorded low to normal blood pressures. However, high blood pressures were recorded in those who were aged 40 and above. Majority of participants were either obese or overweight in that, half of them 175(50%) were obese, while 107(30.7%) were overweight. Only a minimal percentage of 67(19.3%) recorded normal BMIs.

Table 4. 8: Metabolic Status Variable by BMI

	Description	**Normal**	**Obese**	**Overweight**
BP	High	11	76	37
	Normal	22	66	37
	Low	34	32	33
FBS	High	12	47	19
	Normal	55	127	88
TGL	High	1	7	2
	Normal	66	167	105
HDL	Abnormal	54	110	71
	Normal	13	64	36
Waist Circumference	High	9	164	63
	Normal	58	10	44
Metabolic Syndrome Status	At Risk	20	99	49
	Negative	42	1	37
	Positive	5	74	21

From Table 4.8, a greater number of the participants who had normal BMIs also recorded normal levels of FBS (82.1%), TGL (98.5%), and Waist Circumference (86.6%) but had low BP (50.7%) and abnormal HDL (80.6%). However, 62.7% of them tested negative for metabolic syndrome.

Quite a vast majority of those who were overweight also had normal levels of FBS (82.2%) and TGL (98.1%). They however recorded abnormal Waist Circumference (66.0%) and abnormal HDL (58.9%). 45.8% of those who were over-weight, were at risk of developing metabolic syndrome as well. EXAMINER 2 THINKS WE SHOULD HAVE AN OBJECTIVE FOR THIS SECTION

DESCRIPTIVE ANALYSIS OF METS PREVALENCE VARIABLES

Table 4. 9: Descriptive Analysis of Mets Indicators (n=348)

Variable	Minimum	Mean	Maximum	Standard deviation
Age	25	46	65	10.64
BMI	19.37	30.77	64.10	6.55
WC	24	37.51	52.00	5.07
FBS	2.50	5.44	25.10	2.44
HDL	0.66	1.20	1.90	0.28
TRIG	0.57	1.03	2.10	0.28
BP	90/60	130/77	220/120	22.0/12.7

The results in Table 4.9 shows that the minimum and maximum age of participants were 25 years and 65 years respectively, with a mean age and standard deviation of (46years, ± 10.64). With the Body Mass Index, the minimum BMI was 19.37kg/m^2 and the maximum BMI was 64.10kg/$m^{2.}$ The mean BMI and Standard deviation were (30.77kg/m^2 ± 6.55). For Waist Circumference, the minimum recorded was 24 inches and maximum was 52 inches. The average or mean waist circumferences was 37.51inches with a standard deviation of ± 5.07. Findings for Fasting Blood Sugar (FBS) revealed a minimum value of 2.5mmol/L and a maximum value of 25.1mmol/L. The recorded mean value and standard

deviation were (5.44mmol/L, ±2.44). Again the study population had minimum and maximum High Density Lipoproteins (HDL) values of 0.66mmol/L and 1.9mmol/L respectively with mean and standard deviation represented by (1.2mmol/L ± 0.28). Desired Triglyceride (TGL) levels are expected to fall below 1.7mmol/L, the findings from this study revealed that the minimum and Maximum TGL values were 0.57 mmol/L and 2.10 mmol/L respectively. The mean TGL was however 1.03mmol/L with a standard deviation of ±0.28. Last but not the least, the study population had minimum and maximum Blood Pressure (BP) values of 90/60 mmHg and 220/120 mmHg respectively with mean of 130/77 mmHg and standard deviation of ± 22.0/12.70.

Descriptive analysis for MetS indicators positive for MetS, at risk and negative for MetS participants

This section presents a descriptive analysis of the MetS indicators positive for MetS, at risk and negative for MetS participants in an ANOVA and Tukey Test of significance.

Table 4. 10: Descriptive Analysis for MetS Indicators Positive for Mets, at Risk and Negative for Mets Participants

Parameter	Mean	At risk	Negative	Positive	P-value
AGE	**46**	**46.7**	**40.7**	**50.5**	**0.000**
W.C	**37.51**	**38.2**	**32.21**	**40.60**	**0.000**
BMI.	**30.77**	**31.71**	**25.04**	**33.79**	**0.000**
FBS	**5.44**	**5.2**	**4.6**	**6.4**	**0.000**
HDL	**1.20**	**1.3**	**1.1**	**1.2**	**0.000**
TRIG	**1.03**	**1.0**	**0.9**	**1.1**	**0.000**
SYSTOLIC BP	**128.2**	**127.3**	**113.1**	**141.7**	**0.000**
DIASTOLIC BP	**76.8**	**75.3**	**68.6**	**85.6**	**0.000**

- **Age**

The overall average age for the participants was 46 years. The average age for those at risk, negative and positive were, 47 years, 41 years and 51 years, respectively. There was a significant difference in the age of the participants with different metabolic syndrome status. The result of a Tukey test indicated that there is a statistically significant difference in the ages between those who are negative and those who are at risk, between those positive and those at risk and between positive and negative participants.

- **BMI**

The overall average BMI for the participants is 30.77. The average BMI for those at risk, negative and positive were, 31.71, 25.04 and 33.79, respectively. There was a significant difference in the BMI of the participants with different metabolic syndrome status. The result of a Tukey test indicated that there was a significant difference in the BMI between those who were negative and those who were at risk, between those positive and those at risk and between positive and negative participants.

- **HDL**

The overall average HDL for the participants is 1.20. The average HDL for those at risk, negative and positive were, 1.3, 1.1 and 1.2, respectively. There was a significant difference in the HDL of the participants with different metabolic syndrome status. The result of a Tukey test indicated that there was a significant difference in the HDL between those who were negative and those who were at risk and between those positive and those at risk.

- **Waist Circumference (WC)**

The overall average WC for the participants is 37.51. The average WC for those at risk, negative and positive were, 38.2, 32.21 and 40.60, respectively. There is a statistically significant difference in the WC of the participants with different metabolic syndrome status. The result of a Tukey test indicated that there is a statistically significant difference in the WC between those who are negative and those who are at risk, between those positive and those at risk and between positive and negative participants.

- **FBS**

The overall average FBS for the participants is 5.44. The average FBS for those at risk, negative and positive were, 5.2, 4.6 and 6.4, respectively. There was a significant difference in the FBS of the participants with different metabolic syndrome status. The result of a Tukey test indicated that there was a significant difference in the FBS between those who are negative and those who are at risk and between those positive and those at risk.

- **TRIG**

The overall average TRIG level for the participants was 1.03. The average TRIG for those at risk, negative and positive were, 1.0, 0.9 and 1.1, respectively. There was a significant difference in the TRIG of the participants with different metabolic syndrome status. The result of a Tukey test indicated that there was a significant difference in the TRIG between those who were negative and those who were at risk and between those positive and negative participants.

- **SYSTOLIC BP**

The overall average Systolic blood pressure for the participants is 128.2. The average systolic BP for those at risk, negative and positive were, 127, 113.1 and 141.7 respectively. There was a significant difference in the systolic BP of the participants with different metabolic syndrome status.

The result of a Tukey test indicated that there was a significant difference in the systolic BP between those who were negative and at risk and between those who were positive and at risk, and between the positive and negative participants.

- **DIASTOLIC BP**

The overall average diastolic blood pressure for the participants is 76.8. The average diastolic BP for those at risk, negative and positive were: 75.3, 68.6 and 85.6 respectively. There was a significant difference in the diastolic BP of the participants with different metabolic syndrome status. The result of a Tukey test indicated that there was a significant difference in the diastolic BP between those who were negative and at risk and between those who were positive and at risk, and between the positive and negative participants.

4.2.2.3 Positive for Metabolic Syndrome Participants

In this section, the focus is on (n=100) MetS positive women. The results of the (n=100) were extrapolated from n=348 and analyzed and the outcome is presented in the table below. However, these results will be used as part of the pre and post outcome evaluation, presented in chapter 8.

Table 4. 11: Demographic Data (n=100)

	Description	**Frequency (n) & Percentage (%)**
Age group	20-29	3(3)
	30-39	6(6)
	40-49	30(30)
	50-59	44(44)
	60-69	17(17)
Education	None	9(9)
	Primary	16(16)
	Middle school	51(51)
	Secondary	21(21)
	Tertiary	3(3)
Marital status	Divorced	16(16)
	Single	9(9)
	Widowed	22(22)
	Married	53(53)
Religion	Christians	95(95)
	Tradition	2(2)
	Muslim	3(3)
Sociocultural status/Tribe	Akans	57(57)
	Gas	26(26)
	Ewes	8(8)
	Others	9(9)
Hypertension	Yes	43(43)
	No	57(570
Diabetes	Yes	10(10)
	No	90(90)
On Medication	Yes	48(48)
	No	5(50

Table 4.11 above gives a tabulation of the biodata in terms of Age, Educational Status, Marital Status, Religion, Tribe, Hypertension status, Diabetes status, and participants on

medication for those who tested positive for Metabolic Syndrome. In all (n=100) participants tested positive for Metabolic Syndrome from a total of 348.

- **Age Distribution for Participants with Positive Metabolic Syndrome**

  The results in Figure 4.11 above revealed that majority of the participants 44(44%) who tested positive for Metabolic Syndrome were within the age range of 50-59years. 30(30%) were between 40-49years, 17(17%) were between 60-69years, 6 (6%) were between 30-39 years, while the remaining 3(3%) within the 20-29years age group.

- **Educational Distribution for MetS Positive Participants**

  Results for the Educational Status distribution of participants who tested positive for Metabolic Syndrome presented in Table 4.11 above revealed that majority 51 (51%) were middle school leavers, 21(21%) had achieved some form of secondary education, 16(16%) had basic primary education, 3(3 %) had achieved some form of tertiary education, while 9(9%) stated they had not achieved any form of formal education.

- **Marital Status Distribution for Participants with Positive Metabolic Syndrome**

  Table 4.11 gives a representation of the marital statuses of all participants who tested positive for Metabolic Syndrome in the study. The results of the study revealed that 53(53%) were married representing the majority. A total of 22(22%) were widowed, 16(16%) were divorced, while 9(9%) were single.

- **Religion Distribution for Participants with Positive Metabolic Syndrome**

  The study revealed that 95(95%) of participants were Christians representing the majority, 3(3%) were Muslims, while the remaining 2(2%) belonged to the Traditional religion.

- **Sociocultural/Tribal Distribution for Participants with Positive MetS Status**

  The Sociocultural/Tribal distribution of all participants who tested positive for Metabolic Syndrome in the study showed that 57(57%) were Akans, 26 (26%) were Gas, 8(8%) were Ewes while the remaining 9(9%) were of other tribes.

- **Hypertension Distribution for Participants with Positive Metabolic Syndrome**

  In an attempt to obtain past medical data, participants were required to indicate if they had been diagnosed with hypertension at any point in their lifetime. Table 4.11 depicts that majority of the participants 57(57%) strongly indicated "NO" with the rest of them 43(43%) indicating "YES".

- **Diabetes Distribution for Participants with Positive Metabolic Syndrome**

  In an attempt to obtain past medical data, participants were required to indicate if they had been diagnosed with diabetes at any point in their life time. From Table 4.11, majority of 90 (90%) participants strongly indicated "NO" with just a few of them 10(10%) indicating "YES".

- **Participants on medication**

  Participants who tested positive for metabolic syndrome and stated they were known Hypertensives or Diabetics, were asked if they were on any form of medication. The reports gathered indicated that 48 (90.5%) out of the 53 were on medication while the remaining 5 (9.5%) stated they were not on any medication for the management of their conditions.

4.2.2.3.1 Knowledge Level of MetS Prevention among Mets Positive Participants

Table 4. 12: Knowledge Level of Metabolic Syndrome Prevention among MetS Positive Participants (n=100)

Questions		Correct	Incorrect
Question 1	Which of the following is not a risk factor for heart disease and stroke (MetS)?	13(13)	87(87)
Question 2	Which of the following best describes a woman's waist too big?	3(3)	97(97)
Question 3	Which best describes "High Blood Pressure"?	9(9)	91(91)
Question 4	Which best describes the criteria for "High Fasting Blood Sugar?"	0(0)	100(100)
Question 5	Which of the following is not directly related to *"Waist is too big (abdominal obesity)"?*	72(72)	28(28)
Question 6	What are the complications that result from suffering heart and blood vessel diseases (MetS)?	20(20)	80(80)
Question 7	What habits lead to the risk of developing heart diseases, high blood cholesterol, high blood sugar and high blood pressure (MetS)?	91(91)	9(9)
Question 8	Which of the following is not a self-care way to prevent heart diseases, high blood pressure, high blood sugar, dyslipidemia and abdominal obesity (MetS)?	81(81)	19(19)
Question 9	Which is not true in the medical treatment or care for people with heart diseases, high blood sugar, high blood pressure, high blood cholesterol and abdominal obesity (MetS)?	98(98)	2(2)

	Above 50%	22(22)	
	Below 50%	78(78)	

Table 4.12 presents the knowledge level of participants who tested positive for MetS about metabolic syndrome. Nine questions were asked all the (n=100) participants in the study who tested positive for Metabolic Syndrome to understand the knowledge they had with respect to Metabolic Syndrome. Participants of the study were asked in question 1 to - identify amongst various possible answers, what was not a risk factor for heart disease and stroke. The results in figure 40 above depicted that majority, 87 (87%) gave incorrect responses. While only 13(13%) out of the total of 100 participants were able to answer correctly. The results of question two which asked; ‘’which of the following is best described as the case of women's “waist was too big” revealed that a significant majority of the participants again did not know the criteria for identifying abdominal obesity as 97 (97%), answered incorrectly while only 3 (3%), were able to answer that question correctly.

Again, the results of third knowledge question asked as represented revealed that majority of participants 91(91%) answered incorrectly to the question; what best describes the criteria for “High blood pressure”. However, the remaining 9 (9%), were able to give correct answers to the question.

The results of the test on the knowledge of MetS among the market women for question 4 also revealed that all the participants 100(100%) did not know what best described “High fasting blood sugar” and so answered incorrectly. Furthermore, when participants were asked about the complications that resulted from suffering heart and blood vessel diseases (MetS), only 20 (20%) knew the correct answer to be “stroke”. A significant number of them 80(80%) were unable to identify the correct answer. This suggested that participants had minimal knowledge and awareness of the complications which resulted from heart and blood vessel diseases or metabolic syndrome. For the seventh knowledge question, 91(91%) participants were conscious of the habits that led to the development of heart

diseases, high blood sugar and high blood pressure (MetS). However, a few of them 9 (9%) were not able to demonstrate knowledge on the habits which could predispose a person to developing the heart diseases, high blood sugar and high blood pressure (MetS). Participants were again asked in question eight to identify the self-care strategies to preventing heart diseases, high blood pressure, high blood sugar and cholesterol and abdominal obesity (MetS). Majority of them; 81 (81%) were able to identify the correct answer while the remaining 19(19%), gave incorrect answers.

Finally, participants were asked in question nine to indicate what was not true in the medical treatment or care for people with heart diseases, high blood sugar, high blood pressure and high blood cholesterol (MetS). Almost all the participants 98(98%), provided the correct responses to this question. In the contrary, 2(2%) gave wrong answers, indicating that they did not have knowledge about the medical treatment of Metabolic Syndrome. This suggests that participants had knowledge about the medical treatment of MetS.

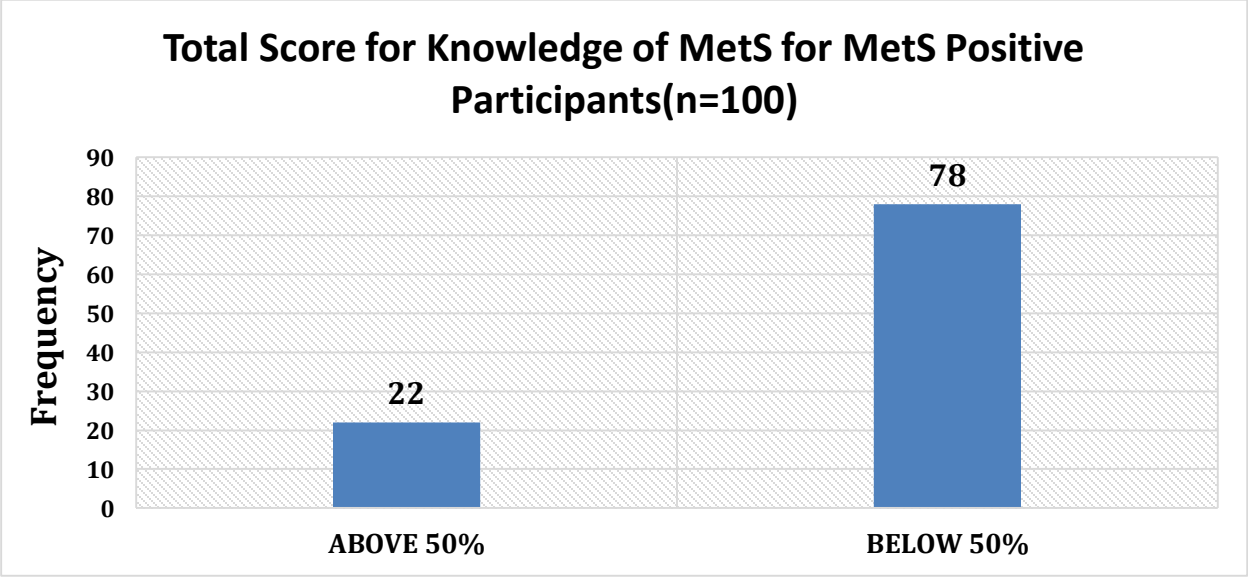


Figure 4. 19: Total Knowledge Score for METS Positive Participants

A total assessment of the MetS Positive participants' knowledge on metabolic syndrome was conducted and presented in Figure 4.19. From the analysis, it was revealed that only

22 (22%) had adequate knowledge of metabolic syndrome and its management and therefore scored above 50%, while an inordinate number of them 78(78%) basically did not have adequate knowledge on metabolic syndrome and its management and hence scored below 50%.

This is therefore indicative that the participants who tested positive for MetS basically had little knowledge on metabolic syndrome.

- **Knowledge of MetS among Positive for MetS Participants**

Similar to the general population for the study, the results revealed that participants who tested positive for MetS also had poor knowledge about MetS and its associated complications. With respect to knowledge, the study revealed that 78% scored below 50%, while only 22% scored above 50%. The minimum score was 0 out of 100 and the maximum score was 78. The mean K-MS score and standard deviation was (43 ± 13.74). This suggests that the population had poor knowledge about MetS, hence there is a need for public education on MetS.

This result is consistent with Lo et al., (2016) who also assessed the knowledge level of Chinese adults using the same K-MS tool. The researchers indicated that the mean K-MS score was 44.9 out of 100; most participants (61%) scored below 50, indicating a poor level of MS knowledge. The researchers therefore concluded that concurrently, public health efforts regarding primary prevention of cardiovascular diseases should be targeted at improving MetS knowledge. This result is also corroborated by Wang et al (2019) who revealed that even though 56% of their participants had at least three cardio metabolic risk factors, indicating the presence of MetS, their average metabolic syndrome knowledge score (MSKS) was very low, hence suggested the need for intensive patient education on MetS.

The knowledge level of the women about MetS and its complications was also found to be low. There is therefore is the need for health personnel to adopt prevention strategies by focusing attention on management and prevention of MetS through education and lifestyle interventions.

4.2.2.3.2 POSITIVE FOR METABOLIC SYNDROME: PREVALENCE RATE

Table 4. 13: MetS Parameters for Positive Participants (Prevalence, n=100)

Variables		**Numbers (n) & Percentage (%)**
Waist Circumference	Normal	0(0)
	Abnormal	100(100)
HDL	Abnormal	75(75)
	Normal	25(25)
Triglyceride	High	8(8)
	Normal	92(92)
FBS	High	54(54)
	Normal	46(46)
BMI	Normal	5(5)
	Obese	74(74)
	Overweight	21(21)
BP status	High BP	75(75)
	Low BP	11(11)
	Normal BP	14(14)

Table 4.13 above gives a tabulation of the prevalence data in terms of waist circumference, HDL, TGL, FBS, BMI, and BP Status distribution of all the participants who tested positive for Metabolic Syndrome. Hundred (n=100) tested positive for MetS from a total of 348 participants. It further gives a representation of the MetS Status for those who tested positive among the participants. For the waist circumference, all 100(100%) were affected. They all had an abnormal (high) waist circumference. With respect to HDL, 75(75%) participants had an abnormal HDL while 25(25%) had normal HDL. The results of the triglyceride distribution revealed that out of the 100 respondents who tested positive, 92(92%) of them had normal TGL. However, 8 (8%) had high triglyceride values. The distribution with regards to FBS of the participants revealed that more than half of the 54(54%) recorded high FBS while 46(46%) recorded normal FBS. For the BMI status for those who tested positive for MetS, a majority of 75(75%) were found to be obese, 21(21%)

were overweight, whilst the remaining 4(4%) had normal BMIs. For the BP status of participants, more than half of the distribution 75(75%) were discovered to be having high BP, 11(11%) had low BP while the remaining 14(14%) had normal ranges of BP.

4.2.2.3.3: Descriptive Analysis of MetS Prevalence Variables for Participants Positive for MetS

This section presents the mean and standard deviations for participants' MetS predictors

Table 4. 14: Descriptive analysis of METS prevalence variables (positive for MetS, n=100)

Variable	Minimum	Mean	Maximum	Standard deviation
Age	27	51	65	8.70
BMI	21.22	33.79	64.10	6.43
WC	36	40.59	52	3.75
FBS	2.50	6.42	25.10	3.17
HDL	0.79	1.18	1.86	0.24
TRIG	0.59	1.11	2.10	0.33
BP	100/60	144/87	210/120	22.94/12.57
Period of trading	1.00	21.82	45	9.26
Knowledge	0.00	43	78	13.74

The results of the study presented in table 4.14 showed that the minimum and maximum ages of participants were 27years and 65years respectively, with a mean age and standard deviation of (51years, ± 8.70). With the Body Mass Index (BMI), the minimum was 21.22kg/m^2 and the maximum was 64.10kg/$m^{2.}$ With a mean and standard deviation of (33.79kg/m^2 ± 6.43) For Waist Circumference, the minimum recorded was 36inches and maximum was 52inches. The average or mean waist circumference was 40.59inchs with a standard deviation of ± 3.75. Findings for Fasting Blood Sugar (FBS) revealed the minimum value as 2.5mmol/L and a maximum value of 25.1mmol/L. The recorded mean value and standard deviation was (6.42mmol/L, ±3.17). Majority of the population used for this study had high fasting blood sugar levels as the mean value was above 5.6mmol/L

(6.42mmol/L). Again, the study population had minimum and maximum High-Density Lipoproteins (HDL) values of 0.79mmol/L and 1.86mmol/L respectively with mean and standard deviation represented by (1.18mmol/L ± 0.24) indicating that the population had low HDL. Desired Triglyceride (TGL) levels are expected to fall below 1.7mmol/L, the findings from this study revealed that the minimum and Maximum TGL values were 0.59 mmol/L and 2.10 mmol/L respectively. The mean TGL was however 1.03mmol/L with a standard deviation of ±0.33. The study population had minimum and maximum Blood Pressure (BP) values of 100/60mmHg and 210/120mmHg respectively with mean of 144/87mmHg and standard deviation represented as ± 22.94/12.57. In addition to that the study population had minimum and maximum period of trading as 1year and 45years respectively with mean and standard deviation represented by (21.82mmol/L ± 9.26). Last but not least, with respect to knowledge, the minimum score was 0 out of 100 and the maximum score was 78. The mean and standard deviation were (43 ± 13.74).

4.2.2.3.4 RELATIONSHIP BETWEEN VARIABLES FOR POSITIVE FOR METABOLIC SYNDROME

Table 4. 15: Age against Educational Level

	None	**Primary**	**Middle School**	**Secondary**	**Tertiary**
20-29	0	0	0	2	1
30-39	0	1	2	3	0
40-49	0	6	17	7	0
50-59	6	7	21	8	2
60-69	3	2	11	1	0

The Educational Status distribution of participants as against their respective ages for those who tested positive for MetS revealed that 91(91%) had achieved some form of formal education, at least up to the primary level, with majority of them 56(56%) going as far as the middle school. Those aged 50-59 years recorded the peak values 41(41%) of people who had achieved some form of formal education at least to the primary level. Among

those who had not received any form of education, the 50-59 years group again recorded the highest number 6(66.7%).

Table 4. 16: Age against Marital Status

	Divorced	Married	Single	Widowed	Total
20-29	0	0	3	0	3
30-39	0	5	1	0	6
40-49	7	15	3	5	30
50-59	5	29	2	8	44
60-69	4	4	0	9	17
Total	16	53	9	22	100

Table 4.16 above shows the distribution of the marital statuses against the respective age ranges of participants. The table depicts that 53(53%) were married with a majority of them 54 (54.7%) located within the 50-59years age range. On the other hand, 47(47%) of them were found to be either single, divorced or widowed. It can therefore be concluded that 47% of the participants were therefore living independent lives.

Table 4. 17: Education Level against Marital Status

	Divorced	**Married**	**Single**	**Widowed**	**Total**
None	1	7	0	1	9
Primary	5	9	1	1	16
Middle School	5	27	4	15	51
Secondary	5	9	3	4	21
Tertiary	0	1	1	1	3
Total	16	53	9	22	100

Table 4.17 above shows the distribution of the marital statuses against the respective educational background of the participants. The results revealed that 91(91%) had achieved some form of education up to at least primary level with majority of them 50(50.5%) being married. 9(9%) however, did not achieve any form of education, but 77(77.8%) of this group were married.

4.2.2.3.4 DISCUSSION OF FINDINGS

The discussion section of the findings is divided into two sections. The first part is the result of the total sample (n=348). The second part is of (n=100). The reason why they are presented independently is that the latter can be used in the pre and post comparison stage.

4.2.2.3.4.1 Prevalence of Metabolic Syndrome among Participants

Mandob, Samuel, and Viviane (2015) revealed an estimate of 7 to 56 % prevalence of metabolic syndrome in women globally. This session entails discussion of findings from the study as regards the prevalence of MetS among (n=348) participants in relation to their age, gender and metabolic syndrome indicators or predictors.

- **Positive for MetS**

The data analysis of this study revealed that 28.7% of participants tested positive for Metabolic Syndrome. This result tallies well with that of Owolabi et al., (2017) whose study revealed that the prevalence of metabolic syndrome was 21.8%. Similarly, Anas Ahmad Sabir et al., (2016) also found out that the overall prevalence of metabolic syndrome was 35.1%. The researchers however used the NCEP ATP III guidelines or classification for metabolic syndrome, while the current study used the IDF criteria. Martinez-Torres et al., (2017) on the contrary revealed in another study in Columbia that the overall prevalence of Metabolic Syndrome was 6.0% (95% CI = 4.5% to 7.6%). Although Martinez-Torres et al., (2017) also used the IDF criteria for MetS, they reported a rather low prevalence rate among their participants compared to the current study.

- **At Risk for MetS**

The current study again revealed that a higher percentage of Participants (48.3%) were found to be at risk of MetS. Additionally, a vast majority of the participants 77% had at least one predictor of MetS. This result is similar to that of Osei-Yeboah et al., (2018) who also found out in Ghana that more than half of participants presented at least one Cardiometabolic risk factor.

The findings of the current study is indicative that the prevalence of MetS is high among market women in Kaneshie and a significant majority of the women are also at risk for developing Metabolic Syndrome.

- **Negative for MetS**

The results of the current study, further revealed that 23% of participants tested negative for MetS per the IDF criteria for metabolic syndrome. There is even a likelihood of some of these negative for MetS participants becoming positive for MetS since they are also exposed to the market related factors contributing to MetS. Osei Yeboah et al., (2018) also found out that a small percentage of their study participants tested negative for MetS. Contrary to these two findings in Ghana, Martinez-Torres et al., (2017)'s study in Columbia rather revealed that the prevalence of MetS was very low among their population since over 90% of their study participants tested negative for MetS. The differences in the findings can be linked to the fact that MetS prevalence differs among different populations. This supports Okafor (2012)'s assertion that the prevalence of the metabolic syndrome varies between different populations.

- **Gender/MetS Prevalence in Women**

The current study was conducted among women and the findings revealed that over 70% of participants were either at risk or had MetS. Similarly, Saklayen (2018) found out that in all the Middle Eastern countries, prevalence of MetS was much higher among women than men. In comparison, Owolabi et al., (2017) further revealed that the prevalence of MetS was 15.6% and 24.8% among males and females respectively, this implied that the incidence of MetS was found to be higher in women compared to men as reported by the researchers. Similar to this results, Anas Ahmad Sabir et al (2016) also found out that the overall prevalence of metabolic syndrome was 35.1% with the females having 42.83% and the males 27.36% respectively based on the NCEP ATP III guidelines or classification for metabolic syndrome. Martinez-Torres et al., (2017) on the contrary revealed in another study on the prevalence of Metabolic Syndrome in Columbia that MetS was found to be higher in men than women.

The high incidence of metabolic syndrome among the market women may be attributed to their lifestyle (physical inactivity and diet). Arthur et al., (2013) however in a study, reported an increased incidence of metabolic syndrome among Ghanaian women, but he attributed this increased incidence to predisposing factors such as the increasing adaptation of "western" lifestyle as well as the increased tendency of weight gain after birth.

- **Age and Prevalence of MetS**

The results of the study showed that the minimum and maximum ages of respondents were 25years and 65years respectively, with a mean age and standard deviation of (46years, ± 10.64). Again, the analysis of the results revealed that the 50-59years age group recorded the peak value for positive participants represented by 42.7%, followed by the 60-69year group (37.9%). The 60-69years group again recorded the peak value for participants who were at risk (55.5%), while the 20-29years group recorded the peak value for those who were negative (48%). This suggests that the incidence of Metabolic Syndrome among the participants was found to be increasing with age, and post- menopausal women were identified to have higher incidence of MetS and were at high risk of developing MetS as well.

The result of this study is consistent with Osman et al., (2015) who revealed in a study conducted in Northern state, Sudan that the total prevalence of metabolic syndrome among postmenopausal women was 51.4%. The researchers posited that postmenopausal status was associated with an increased risk of metabolic syndrome. Similarly, Khalid et al., (2018) also reported that MetS prevalence is consistently statistically significant with increasing age until the sixth decade then starts to decline.

The result of the current study is also similar to a study conducted by Sarma and Srikanth (2015) who also revealed that the prevalence of metabolic syndrome was 20% in women of 30-40 age group and 63.33% in women of 40-50 years of age group based on the NCEP ATP-III criteria. They further stated that metabolic syndrome present in epidemic proportions among the elderly represents one of the major threats to longevity and healthy aging.

The current study again brought to fore the fact that when the ages of the participants were compared with their metabolic status variables, it was observed that majority of participants recorded abnormal HDL, normal TGL, and normal FBS irrespective of the age distribution. It was also inferred that irrespective of the BMI status of the participants, their HDLs were relatively low. However, majority of participants recorded high BP and high waist circumference with increasing age distribution. Similarly, a greater number of them became obese and overweight with their increasing age distribution. This supports the assertion by Okafor (2012) that metabolic syndrome increases with age.

4.2.2.3.4.2 Metabolic Syndrome Indicators

- **Waist circumference (WC)**

  The results of this study clearly outline the prevalence of waist circumference as an indicator for Metabolic Syndrome among the total participants. Majority of 67.5% had abnormally high waist circumference as against 32.5% of women who had normal waist circumferences. The minimum recorded waist circumference was 24inches and maximum was 52inches, with an average or mean of 37.51inches and a standard deviation of ± 5.07. The findings therefore suggest that the population was predominantly centrally obese.

  This finding is congruent with Martinez-Torres et al., (2017) findings which revealed that high waist circumference was among the most prominent components of MetS. Similarly, in Mandob and Ombolo (2017)'s study, abdominal obesity accounted for 60.47% which was considered to be among the prevalent MetS indicators. Again, Tsou et al., (2014) also revealed that waist circumference (WC) were found to be among the three most common risk factors for MetS. This implies that waist circumference is the number one predictor of MetS.

- **High Density Lipoprotein (HDL)**

  From the statistical analysis of this study, it was reported that majority of participants representing 67.5% had Abnormal High-Density Lipoprotein (HDL) levels compared with the remaining 32.5% who had normal High-Density Lipoprotein (HDL) levels. The study population had minimum and maximum High-Density Lipoproteins (HDL) values of 0.66mmol/L and 1.9mmol/L respectively with mean and standard deviation represented by

(1.2mmol/L ± 0.28) depicting that the population had abnormal values of HDL. This finding is again consistent with Mandob and Ombolo (2017)'s study which also found out that 73.95% of their participants had low levels of HDL. Anas Ahmad Sabir et al (2016) also revealed that 62.2% of their female participants in a study they conducted on MetS had low HDL levels. Low levels of HDL, is therefore said to account for most cases of MetS especially in Africa.

- **Triglycerides (TGL**

  The Analysis of data gathered on triglycerides (TGL) revealed that majority of the study participants (97.1%) had normal levels of TGL in their blood stream while just a few (2.9%) recorded higher levels of TGL in their blood stream. Desired Triglyceride (TGL) levels are expected to fall below 1.7mmol/L, the findings from this study revealed that the minimum and Maximum TGL values were 0.57 mmol/L and 2.10 mmol/L respectively. The mean TGL was however 1.03mmol/L with a standard deviation of ±0.28 suggesting that the study population in general had appreciable normal levels of TGLs. Similar to this results, Anas Ahmad Sabir et al., (2016) further revealed in their study that only a few participants had high triglyceride levels. On the contrary, Martinez-Torres et al., (2017) identified in their study that, high triglyceride levels were among the prevalent components of MetS. Triglyceride as a predictor of MetS therefore varies among different populations.

- **Fasting Blood Sugar**

  The distribution of data gathered for Fasting Blood Sugar (FBS) revealed that only 78(22.4%) of the participants had high FBS whiles over half of the participants' population, 270 (77.6%) had normal values of FBS. Findings for Fasting Blood Sugar (FBS) revealed a minimum value of 2.5mmol/L and a maximum value of 25.1mmol/L.

  The recorded mean value and standard deviation were (5.44mmol/L, ±2.44). It can therefore be concluded that majority of the population used for this study fell within normal ranges for this Metabolic Syndrome variable (FBS) as the mean value was less than 5.6mmol/L. Hence the population is said to have normal FBS. Conversely, Anas Ahmad Sabir et al., (2016), on the other hand revealed in a study they conducted in Northern Nigeria that dysglycemia was the third highest component of MetS. Similarly, Tsou et al.,

(2014) also found out in their study that high blood sugar was among the three most common risk factors for MetS. This indicates that triglyceride levels as an indicator for MetS also varies in different countries.

- **Blood pressure (BP)**

The analysis of data gathered on the Blood Pressure (BP) revealed that 35.9% of the participants involved in the study had normal BP levels, and a significant number of them (35.6%) also had High BP level. However, the remaining 28.4% had low BP. Last but not the least, the study population had minimum and maximum Blood Pressure (BP) values of 90/60mmHg and 220/120mmHg respectively with mean of 130/77mmHg and standard deviation of ± 22.0/12.70 indicating that their blood pressures fell within the normal range. This notwithstanding, Blood pressure was found to be the third most common risk factor for MetS in this study.

Similar to this finding, Tsou et al.,(2014) further revealed that in Northern Taiwan, abnormalities in blood pressure was found to be among the three most common risk factors for MetS in both males and females. However, in another study in Ghana, high blood pressure was identified to be the most prevalent component of MetS among the males while abdominal obesity was the principal component among the females (Osei-Yeboah et al., 2017). This indicates that BP, is one of the commonest risk factors or indicators for MetS globally.

- **Body mass index (BMI)**

With respect to Body Mass Index (BMI), most of the participants, 50% were found to be obese with their BMI values exceeding 30kg/m2. 30.7% had their BMI values ranging between 25-30kg/m2 hence were Overweight, while only 19.3% had normal BMI values with no one falling below 19kg/m2. The minimum BMI was 19.37kg/m^2 and the maximum BMI was 64.10kg/$m^{2.}$ The mean BMI and Standard deviation were (30.77kg/m^2 ± 6.55) depicting how predominantly the population engaged in the study were obese (BMI >30kg/m^2).

This tallies well with Nsiah et al., (2015)'s assertion that high body mass index (BMI) was one of the most critical predictive risk factors of MetS, according to their study. Similarly, Khalid et al., (2018) also reported in their study that MetS prevalence was higher among the obese group in all patients and both genders, and the mean of BMI among MetS was statistically significant.

The results of the study brought to light the fact that majority of the respondents within the age category of 60-69 had unfavorable BMI parameters. 88.6% out of the participants within this age group, were either obese or overweight. This was followed by those within the age group of 50-59 (57.3%). Again, the study revealed that participants within the age group of 40-49, a recorded the largest in terms of the overweight population, as 38% of them were overweight which was on the higher side compared to the other age groups**.** While respondents within the age group of 20-29 years recorded the highest normal readings of 44% with respect to the BMI parameters.

The cross tabulation of BMI and MetS revealed that 75% out of the total distribution positive for Metabolic Syndrome were obese, 21% were overweight, while only 4% had normal BMI. The study also revealed that 58.9% of the at-risk group were classified as obese from the distribution. 29.2% were overweight, while only 11.9% had normal BMI. The distribution further depicts that participants who tested negative for MetS, recorded the peak values in terms of the overweight, and the Normal BMI categories representing 46.2% and 52.5% respectively. Only 1.3% of those who tested negative for MetS was found to be obese. In addition to this finding it was also identified that the more the participants approached over-weight and obesity, the greater their chances of being at risk and testing positive for metabolic syndrome.

In support of this finding, Osei-Yeboah et al., (2018) also revealed in their study that 50.89% of participants who tested positive for MetS, were either obese or overweight. They therefore concluded that aging and adiposity were associated with increasing Cardiometabolic risk.

4.2.2.3.5 Positive for MetS Participants (n=100)

This section presents the discussion of findings from the results of participants who tested positive for metabolic syndrome. It captures the age of participants, metabolic syndrome indicators as well as their knowledge of MetS.

- **Age of Participants**

The results of the study showed that hundred 28.7% of the participants tested positive for MetS. Out of this number, 44% were between the ages of 50-59 years. Thus the 50-59 years group again recorded the peak value for those who tested positive for MetS.

The minimum and maximum age of respondents were 27 years and 65 years respectively, with a mean age and standard deviation of (51years, ± 8.70) for those who tested positive among the participants. In agreement with this study, Khalid et al., (2018) also reported that, higher prevalence of MetS was found to be among age group 50-59 years in females in a study conducted in Saudi Arabia. Similarly, Owolabi et al., (2017) also revealed in their study that the prevalence of Metabolic Syndrome was higher among participants who were aged 56 years and above. In line with the results of the current study, again Osman et al., (2015) revealed in a study conducted in Northern state, Sudan that the total prevalence of metabolic syndrome among postmenopausal women was 51.4%. The researchers posited that postmenopausal status were associated with an increased risk of metabolic syndrome. Therefore, in order to prevent cardiovascular disease, there is a need to evaluate metabolic syndrome and its components from the time of the menopause.

- **Period of Trading**

The study population had minimum and maximum period of trading as 1year and 45years respectively with mean and standard deviation represented by (21.82mmol/L ± 9.26). This indicated that the women were typical market women, majority of whom have been working in the market for quite a number of years with a lot of experience and hence were the right respondents for this research.

- **Metabolic Syndrome Indicators**

The results of the study revealed that alarmingly, all the participants (100%) who tested positive for MetS had an abnormally high waist circumference. The minimum recorded was 36 inches and maximum was 52 inches. The average or mean waist circumference was 40.59 inches with a standard deviation of ± 3.75. The findings again suggest that the population of MetS positive participants was predominantly centrally obese with respect to the IDF criteria.

With respect to the participants' HDL, 75% had an abnormal HDL while only 25% had normal HDL. The study population had minimum and maximum High-Density Lipoprotein (HDL) values of 0.79mmol/L and 1.86mmol/L respectively with mean and standard deviation represented by (1.18mmol/L ± 0.24) indicating that the population had low HDL.

For the BP status of participants, more than half of the distribution 75% were discovered to be having high BP, while 14% had normal ranges of BP. This distribution appears not to be favorable, since only 14 participants representing 14% of the distribution had normal BP range. The minimum and maximum Blood Pressure values of participants were 100/60 mmHg and 210/120mm Hg respectively with mean of 144/87 mmHg and standard deviation represented as ± 22.94/12.57. This also indicates that the population had high blood pressure.

The BMI status for those who tested positive also revealed that a vast majority of 75% were found to be Obese, (21%) were overweight, whilst the remaining 4(4%) had normal BMI.

The minimum BMI was 21.22kg/m^2 and the maximum BMI was 64.10kg/$m^{2.}$ The mean BMI and Standard deviation were (33.79kg/m^2 ± 6.43) depicting how predominantly the population engaged in the study was obese (BMI >30kg/m^2).

The distribution with regards to FBS of the participants revealed that more than half of the participants (54%) recorded high FBS while 46% recorded normal FBS. Findings for Fasting Blood Sugar (FBS) again revealed the minimum value as 2.5mmol/L and

maximum value of 25.1mmol/L. The recorded mean value and standard deviation were (6.42mmol/L, ±3.17). Majority of the population used for this study had high fasting blood sugar levels as the mean value was above 5.6mmol/L (6.42mmol/L).

However, the results of the triglyceride distribution revealed that 92% of those who tested positive for MetS had normal TGL, while only 8% had high triglyceride values. Desired Triglyceride (TGL) levels are expected to fall below 1.7mmol/L, the findings from this study revealed that the minimum and Maximum TGL values were 0.59 mmol/L and 2.10 mmol/L respectively. The mean TGL was however 1.03mmol/L with a standard deviation of ±0.33 suggesting that the study population in general had appreciable normal levels of TGLs unlike the other MetS indicators.

The findings of this study revealed that high waist circumference (WC) or central obesity, low levels of high-density lipoprotein and high blood pressure were the three most prevalent MetS indicators or predictors identified among the market women who tested positive for MetS, with WC being the most prevalent. Fasting blood sugar was the fourth most prevalent indicator while only a few participants (8%) had high triglyceride levels, hence TGLS was the least indicator.

Osman et al., (2015) on the other hand, revealed in their study that high abdominal obesity, hypertension and elevated fasting blood glucose were the most prevalent components of metabolic syndrome even though they identified that high abdominal obesity was the most prevalent MetS indicator. Martinez-Torres et al., (2017) also reported that the most prevalent components of MetS identified in their study were low high-density lipoprotein cholesterol, high triglyceride levels, waist circumference, and blood pressure levels.

Mandob and Ombolo (2017)'s findings are also similar to the current study, in that they also identified that low HDL (73.95%), abdominal obesity (60.47%,), had high blood pressure, (47.44%), high fasting blood glucose (18.60%) were the four most predominant MetS indicators while high triglycerides level (17.21%) was the least. However, in the case of Mandob and Ombolo (2017)'s study, low HDL was the topmost indicator unlike the waist circumference in the current study. Anas Ahmad Sabir et al (2016) also identified

low HDL and Central obesity as the most prevalent MetS indicators among women in their study.

Nsiah et al., (2015)'s study in Ghana also indicated that hypertension was found to be the commonest risk factor (60%), followed by central obesity (48.67%), and dyslipidemia (37%). They further revealed that feminity and high body mass index were also contributory factors of MetS. Osei-Yeboah et al., (2017) in a studied population in Ghana also revealed that abdominal or central obesity was the most prevalent Mets indicator among women which is very consistent with this study. In another study, Osei-Yeboah et al., (2018) again found out that high blood pressure, high BMI, and central obesity, and dyslipidemia were the predominant indicators for MetS, while dysglycemia was the least indicator.

The current study again revealed that only 10 (10%) of the participants who tested positive for MetS were known diabetics, of which 9 reported they were on medications, while 43 943%) also indicated that they were known hypertensives, with 39 of them on medications. Osei-Yeboah et al., (2017) however in a study on the prevalence of MetS among diabetic patients in Ghana, revealed that 69.14% had MetS using the IDF criteria. The researchers also identified high blood pressure as the highest MetS component and therefore suggested that this might be as a result of the prevalence of high blood pressure among participants. These suggest that the predictors or components of MetS differ among different age groups, gender and populations.

MetS was found to be prevalent among market women in Ghana, and lifestyle, aging and BMI status are said to be contributory factors to the development of MetS among the women. The most prevalent MetS indicators among the women were found to be High waist circumference (central obesity), low HDL, high blood pressure, high BMI, and high FBS.

4.2.3 SUMMARY

This section presented a description of two quantitative surveys conducted with the aim of exploring the knowledge and prevalence of metabolic syndrome and its prevention among market women in Kaneshie, Accra-Ghana. It also described the relationship among demographics, knowledge of MetS and MetS predictors. The research methods which comprised research design, study population, sample size and sampling technique, data collection instrument and methods as well as analysis of results of the surveys were outlined. This was followed by a discussion of the findings from the study as compared to other studies on the knowledge and prevalence of MetS.

4.3 SECTION B

RESULTS OF QUALITY OF LIFE SURVEY AND OPINIONS OF THE MARKETWOMEN ABOUT MEASURES THAT PROMOTE HEALTH

This section described the results of a quality of life quantitative survey and a qualitative focus group discussion conducted concurrently. It also describes the relationship among QOL domains and MetS predictors. The aim of the quantitative survey was to describe the quality of life of market women with MetS. On the other hand, the focus group discussion sought to explore their opinions about measures that could be implemented to improve health outcomes of women with MetS.

4.3.1 Methodology

A quantitative descriptive survey design was used to collect data regarding the quality of life of the market women with MetS, while a qualitative exploratory descriptive approach was used to explore the opinions of the market women about measures that could promote the health of women with MetS. A summary of the methodology for conducting these studies as well as the results and discussion of findings are presented.

A census sample (n=100) of all women identified to have metabolic syndrome were invited to participate in both the quality of life survey, and the focus group discussion.

The WHOQOL (2005) BREF 26 item questionnaire was used to collect data for the quality of life (Appendix 6). In depth group interviews using a semi-structured interview guide was also used for the focus group discussion.

The data collection procedure, methods for data analysis, validity and credibility as well as trustworthiness of the FGD data is described detail in Chapter three.

Positive for MetS - The International Diabetes Federation-IDF(2006) 's criteria for MetS cited in (Alberti et al., 2009) was used for identifying market women with MetS. The IDF used the following criteria for diagnosing metabolic syndrome.

Central obesity (waist circumference >40inches in men, and 35 inches in women) plus any two of the following four factors :

- High blood glucose (sugar) ≥ 5.6 mmol/L
- Low levels of HDL ("good") cholesterol in the blood: < 1.03 mmol/L in males and < 1.29 mmol/L in females,
- High levels of triglycerides in the blood ≥1.7 mmol/L

- High blood pressure (systolic BP ≥ 130 or diastolic BP ≥ 85 mm Hg)

At Risk Group – Women with one of the following conditions or women with high waist circumference and any one of the following: obesity, diabetes, hypertension, insulin resistance

Negative for MetS - Women without any one of the following conditions or women with normal waist circumference or any of the following: obesity, diabetes, hypertension and insulin resistance.

4.3.2 Results of Findings of the QOL Survey and Focus Group Discussion

This chapter is divided into two sections. Section 4.3.2.1 consists of the Quality of Life results. Then in Section 4.3.2.1, the focus Group discussion results are discussed in relation to the QOL domains.

4.3.2.1: Results for Quality of Life

4.3.2.1.1 Demographic Data and MetS Indicators of Participants (n=100)

This section of the results consists of two parts. The first part is the demographic information (age, educational level, marital status) followed by the participants MetS predictors(, BP, BMI, FBS, Triglyceride, and HDL Levels as indicated in Table 4.18 below.

Participants' MetS predictors were then compared with the QOL domains in the next session.

Table 4. 18: Demographics data (%) for MetS Positive Participants (n=100)

Variables	Description	Frequency (n) & Percentages (%)
Age group	20-29	3(3)
	30-39	6(6)
	40-49	30(30)
	50-59	44(44)
	60-69	17(17)
Education	None	7(7)
	Primary	59(59)
	Secondary	32(32)
	Tertiary	2(2)
Marital status	Divorced	17(17)
	Single	10(10)
	Widowed	22(22)
	Married	51(51)
Waist circumference	High	100(100)
	Normal	0(0)
BP status	High BP	75(75)
	Low BP	11(11)
	Normal BP	14(14)
BMI	Normal	5(5)
	Obese	74(74)
	Overweight	21(21)
FBS	High	54(54)
	Normal	46(46)
Triglyceride (TRIG)	High	8(8)
	Normal	92(92)
HDL	Abnormal	75(75)
	Normal	25(25)

- **Age of Participants**

  The results of the age distribution of participants show that, 3(3%) were between the age range of 20-29 years, 6(6%) fell within the age range of 30-39 years, 30 (30%) were between the age range of 40-49 years, 44 (44%) were aged between 50-59 years, while 17 (17%) were between the age range of 60-69 years. This suggests that MetS increases with age.

- **Educational Level of Participants**

From the results, a significant majority of 59(59%) had received some form of education up to the Primary School level. 32(32%) stated they had acquired education up to Secondary level, while only 2(2%) were able to get to the Tertiary level. However, 7 (7%) did not receive any form of formal education. The results generally suggest that the population was moderately a literate populace. It is therefore concluded that the low socio-economic status of the participants may have accounted for their inability to afford the higher education learning which was depicted on the graph as a gradual decrease from primary education.

- **Marital Status of Participants**

The results of the marital status distribution of participants diagnosed with metabolic syndrome revealed that the majority of 51 (51%) were married, 17 (17%) reported that they were divorced, 22(22%) reported that they were widowed, while 10 (10%) reported that they were single. The high percentage of married participants is consistent with the Ghana situation. The researcher observed that most women aspire to get married. Furthermore, marriage is regarded as of high status and a symbol of honor, happiness, emotional and psychological satisfaction in most parts of Ghana. Support from spouses may influence a person's health seeking behavior and hence prevent the development of MetS.

- **Summary of the Results for Determinants of METS**

The findings presented in this section is the summary of the BP, BMI, FBS, Triglyceride, and HDL Levels as indicated in Table 4.18. The statistical analysis revealed that for the determinants of MetS, all participants who tested positive for MetS 100(100%) had high or abnormal abdominal waist circumference (WC). For High Density Lipoproteins (HDL), 75 (75%) had abnormal HDL while 25 (25%) had Normal HDL.

Also, in the aspect of triglycerides (TGL), 92(92%) had normal TGL while 8(8%) had abnormal TGL. In addition to that for Fasting Blood Sugar (FBS) 46(46%) had normal FBS, while 54 participants (54%) had abnormal FBS.

The analysis further revealed that for Body Mass Index (BMI), only 4 (4%) had normal BMI, 75(75%) were obese, while 21(21%) were overweight.

From the analysis, 14 (14%) of participants had normal BP, 11(11%) had low BP, while 75(75%) had high BP.

4.3.2.1.2 Quality of Life Results

Cronbach's alpha statistical test was conducted to examine the internal consistency of the WHOQOL BREF scale. The Cronbach alpha value obtained after analysis with SPSS version 25 was 0.7 and this was deemed acceptable for the four domains as reflected in

Table 4. 19: Reliability of the WHOQOLBREF 26(2005) tool

DOMAIN	CRONBACH ALPHA
Physical Health	**0.2**
Psychological Health	**0.4**
Social Relationship	**0.5**
Environment	**0.7**
All Domains	**0.7**

Table 4. 20 : Frequency Responses (%) for Facets of the WHOQOL-BREF (n=100)

	Very Poor	**Poor**	**Neither**	**Good**	**Very good**
	1	2	3	4	5
1) General QOL	0(0)	18(18)	37(37)	40 (40)	5(5)
2) General Health	0(0)	21(21)	37(37)	39 (39)	3(3)
Physical Health Domain					
3) Pain and discomfort	19 (19%)	41(41)	26(26)	14 (14)	0(0)
4) Dependence on medication	7 (7%)	19 (19)	41(41)	31(31)	2 (2)
10) Energy and fatigue	0(0)	9 (9)	30 (30)	57 (57)	4(4)
15) Mobility	0(0)	11(11)	29(29)	52(52)	8(8)
16) Sleep and rest	0(0)	16 (16)	24(24)	48(48)	12(12)
17) Activities of daily living	0(0)	8 (8)	29 (29)	49 (49)	14(14)
18) Working capacity	0(0)	7 (7)	24(24)	58(58)	11(11)
Psychological Domain					
5) Enjoy life	0(0)	27(27)	46(46)	23(23)	4(4)
6) Life meaningful	0(0)	9 (9)	37(37)	47(47)	7(7)
7) Memory and concentration	1 (1)	16(16)	21(21)	55(55)	17(17)
19) Self –esteem	0(0)	5 (5)	31(31)	47(47)	17(17)
11) Body image	0(0)	15(15)	32(32)	34(34)	19(19)
26) Negative feelings	7 (7)	9 (9)	34(34)	50(50)	0(0)
Social Domain					
20) Personal relations	0(0)	21(21)	38(38)	30(30)	11(11)
21) Sex	4 (4)	37 (37)	30 (30)	23(23)	6(6)
22) Practical social support	1 (1)	35 (35)	43(43)	18(18)	3(3)
Environmental domain					
8) Physical safety and security	2 (2)	8 (8)	45(45)	38 (38)	7(7)
9) Health of environment	0(0)	11(11)	37(37)	39 (39)	13(13)
12) Financial resources	0(0)	24(24)	37 (37)	29(29)	10(10)
13) Information and skills	0(0)	26(26)	47(47)	24(24)	3(3)
14) Recreation and leisure	1(1)	37(37)	34 (34)	22(22)	6(6)
24) Access to health care	0(0)	6(6)	35(35)	44(44)	15(15)
25) Transport	0(0)	7(7)	45(45)	40(40)	8(8)
23) Living conditions	1(1)	12(12)	16(16)	54 (54)	17(17)

The frequencies of data gathered on the WHOQOL BREF Questionnaire is presented in Table 4.20. The Results shows the results of the distribution of quality of life questionnaire after analysis. Participants were asked to indicate whether their quality of life was very good, good, neither, good nor poor and very poor.

- **Pain and Discomfort**

Findings from participants on the feeling of pain and comfort as presented on in Table 4.20 revealed that a majority of 41(41%) acknowledged that their quality of life was poor in relation to pain and comfort. 19 (19%) asserted that they were in very poor health condition with regards to pain and comfort. Only 14(14%) of the people engaged in the study averred that they had good health in relation to dealing with pain and discomfort. The remaining 26(26%) were however neutral.

- **Dependence on medication**

The Table 4.20 again, shows the results of the information gathered on participants' dependence on medication for treatments. It reflected that 41(41%) selected neither, 31(31%) selected good and 2(2%) opted for Very Good. However, 19(19%) selected Poor indicating they were dependent on medications.

- **Energy and fatigue**

The results again revealed that 61(61%) stated they had good health and energy for activities. 30 (30%) were of a neutral standing while 9(9%) indicated that they had poor quality of life with regards to energy and fatigue since they often experience fatigue.

- **Mobility**

The findings gathered on participant's ability to move around with ease revealed that 60(60%) chose good, 29 (29%) indicated neither whilst a minority group of 11(11%) were of the view that they had poor ability to move or get around.

- **Sleep and Rest**

A significant majority group of 60(60%) stated on the questionnaire that they had good quality of life when it comes to sleep and rest. However, 24(24%) stated that they had

neither good nor bad quality of life in relation to sleep and rest. Only a small minority of 16(16%) had poor ability to sleep or rest.

- **Activities of Daily Living**

For ability to perform activities of daily living, majority 63(63%) reported good health and stated they could perform much of their own activities of daily living, 29(29%) were of the view that they could neither do it or not. While only 8(8%) stated that they could not perform their activities of daily living unassisted. These findings are represented in Table 4.20 above.

- **Work Capacity**

As shown in the Table 4.20, a total of 69(69%) participants said they had good working capacity, 24(24%) indicated neither as a response on the questionnaire while only 7(7%) indicated that they had poor working capacity.

- **Enjoy Life**

Results from the question asked if participants enjoyed life revealed 46(46%) stated that they neither enjoyed life nor did not, followed by 27(27%) who reported good quality of life in terms of enjoying life. The remaining 27(27%) participants opted for poor quality of life in relation to the enjoyment of life.

- **Meaningfulness of Life**

Table 4.20 further shows the results of how meaningful life was to the participants of the study. 54(54%) considered life to be much meaningful to them, followed by 37(37%) who remained neutral, while a minority group of 9(9%) selected poor.

- **Memory and Concentration**

The findings again revealed that majority, 62 (62%) reported having good memory and concentration, 21(21%) were indifferent to the question while only a minority of 17(17%) alluded that they had poor memory and concentration in relation to their quality of life.

- **Body Image**

With regards to this question, 53 (53%) indicated that they had positive body image and 32(32%) persons stated neither as response while the remaining minority group of 15(15%) asserted that they had poor or negative ideations about their body image.

- **Self-Esteem**

Participants were asked about how they felt about their self-esteem. The results displayed in Table 4.20 showed that majority of 64(64%) had good or positive self-esteem. This was followed by 31(31%) who felt neither good nor bad about their self-esteem however, 5(5%) stated they had poor self-esteem.

- **Negative Feeling**

Participants were asked if they had negative feelings about their life, 16(16%) participants answered poor to the question suggesting they had negative feelings, while 34(34%) of them stated neither poor nor good. However, a significant majority of participants 50(50%) selected good indicating that they had positive feelings about their lives.

- **Personal Relations**

With regards to their personal relations, 41(41%) stated that they had good interpersonal relations with others, followed by 38(38%) who remained neutral to the question and a minority of 21(21%) agreed that they had poor personal relations with others. These results are represented in Table 5.5 above.

- **Sex**

With regards to sexual satisfaction, the results show that a majority 41(41%) averred that they had poor sexual satisfaction in life, 30(30%) selected neither as their response whilst a minority of 29(29%) affirmed that they were sexually satisfied in life.

- **Social Support**

Results from the question asked to ascertain participants' support they get from friends, family or others revealed that majority 43(43%) were uncertain of receiving social supports, followed by 36(36%) who opined that they had poor social support from others while the remaining 21(21%) asserted that they were socially supported.

- **Safety and Security**

  With regards to safety and security, majority 45(45%) stated that they felt safe and secured, 45(45) remained neutral. While 10(10%) stated that they felt unsafe and insecure in life.

- **Healthy Environment**

  From the results, a majority of 52 (52%) indicated that they lived within healthy environment, 37 (37%) of them stated neither as their response whilst the remaining 11(11%) indicated that they lived in unhealthy environment.

- **Financial Resources**

  When participants were asked the question whether they had enough money to cater for their needs the responses that emerged revealed that 39(39%) stated they had good finances for their living, followed by 37(37%) who responded that they were neither satisfied nor dissatisfied about their financial situation. However, 24(24%) stated they were displeased about their current financial situation. This is shown in Table 4.20 above.

- **Information**

  Table 4.20 further shows the results of how available vital information are accessible to the participants The report revealed that a majority group of 47(47%) were indecisive so opted for neither, this was followed by 37(37%) who stated that information was readily available to them, while a minority of 26(26%) were of the view that they received little or no information of importance to their health to improve upon it.

- **Recreation and Leisure**

  For the question on engagement in recreation and leisure activities, a majority of 38(38%) selected poor and indicated that they mostly did not involve themselves in any recreational or leisure activities, 34(34%) averred that they sometimes involved themselves and sometimes did not. Only 28(28%) stated they engage themselves in recreational activities. These findings are represented in Table 4.20.

- **Living Conditions**

  When participants were asked how they felt about their living conditions, a significant majority of 71(71%) reported good living conditions to the question suggesting they were satisfied, while 16(16%) of them stated neither. Only 13(13%) were of the view that they had poor living conditions and were therefore unsatisfied.

- **Access to Healthcare**

The findings from the study presented in Table 5.3 above again revealed that majority of 59(59%) reported they have easy access to healthcare, followed by 35(35%) who stated neither to the question. 6(6%) however stated they did not have easy access to healthcare whenever they wanted to.

- **Transport**

The results further revealed that 40 (40%) and 8 (8%) participants reported that their means of transport was good and very good respectively, 7(7%) of them however revealed their means of transport was bad. while 45 (45%) remained neutral, and could not tell whether their means of transport was good or bad as regards their quality of life.

- **Global Quality of Life**

Table 4.21 below presents the results of the Global Quality of life scores of participants as depicted on the WHOQOL BREF 26 questionnaire.

Table 4. 21: Global Quality of Life (n=100)

	Minimum	**Mean**	**Maximum**	**Std. deviation**
Global quality of life	2.0	3.32	5.0	0.83
Health related quality	2.0	3.24	5.0	0.82

Table 4.22 below presents the results of the descriptive analysis of the four main domains of quality of life of participants. A higher mean score is suggestive of good health whiles a lower score indicated poor health. Participants scored over 50% in all the QOL domains.

Table 4. 22: Descriptive Analysis of the Domains of Quality of Life (n=100)

	Minimum	Mean	Maximum	Std. deviation
Physical health	35.71	58.70	78.60	8.60
Psychological health	41.70	61.30	83.30	10.80
Social relationships	16.67	50.67	100.00	16.18
Environmental health	34.38	59.66	90.62	11.71

A critical look at the Table 4.22 shows that for physical health the mean score obtained by the (100) participants was 58.7. This finding suggests that participants had an appreciable level of quality of physical health as accounted for by most of them scoring over 50% for this domain. However, the minimum score recorded was 35.7 and the maximum score was 78.6 with a standard deviation of 8.6.

Again, the Table 4.22 shows the findings obtained for psychological health domain. The average score obtained by participants for this domain depicted that majority of the participants had good psychological health as average score exceeded 50%. This is represented in the table above as 61.30 with a standard deviation of 10.80 about the mean. The minimum and the maximum score recorded were 41.7 and 83.3 respectively.

Table 4.22 again reveals that for Social relationships, results were favorable and depicted that respondents had fairly good social relationships and interactions as the average score obtained was 50.67. However, the minimum and maximum score obtained here were 16.7 and 100 respectively with a standard deviation of 16.2 about the mean.

Finally, mean score obtained for the Environmental health domain was 59.7 depicting good quality of life with a standard deviation of 11.7 about the mean. This suggested that the participants generally had favorable environmental conditions that contributed to their health and wellbeing. The minimum and the maximum score recorded were 34.4 and 90.6 respectively.

- **Pearson's Correlation Coefficient of Domains**

  A Test of significant relationship between scores obtained for physical health and psychological health was done with Pearson Correlation as indicated in Table 4.23

Table 4. 23: Pearson's Correlation Coefficient of Domains (n=100)

Domains	N	Correlation Coefficient	P-Value
Physical health and psychological health	100	0.3	0.01
Physical health and social relationship	100	0.02	0.9
Physical health and environmental health	100	0.20	0.02
psychological health and social relationship	100	0.2	0.04
psychological health and environmental health	100	0.5	0.00
Social relationship and environmental health	100	0.3	0.00

The results presented in Table 4.23 showed that a statistical significance exists between the two variables, therefore the means differ significantly at $p<0.05$ i.e. p-value = 0.01. Pearson correlational (r) analysis of the scores revealed a slightly strong positive linear relationship between the two variables (r=300). This means that those who had high scores in physical health assessment also happened to have scored high in psychological health assessments. (r=0.300, p=0.01).

The test of significant relationship between scores obtained for physical health and social relationship presented in the above indicated that there was no statistical significance difference between the two variables, therefore the means did not differ significantly at the $p<0.05$ i.e. p-value = 0.900. Pearson correlational (r) analysis of the scores revealed a very weak positive linear relationship between the two variables (r= 0.020). This means that those who scored high scores on physical health assessment also happened to have scored very low on social relationships. (r=0.020, p=0.900).

The results further revealed that there is significant association between the means of the variables; physical health and environmental factors i.e. p=0.020, therefore the p-value is less than 0.05 ($p<0.05$). Pearson correlation (r) findings also showed an evidence of slight positive linear relationship between the two variables (r= 0.200). This shows that respondents who attained high scores in one variable, may also score slightly high scores for the other variable thus environmental health.

Test of significant relationship between scores obtained for psychological health and social relationship also showed that statistical significance exists between psychological health and social relationships i.e. p-value = 0.000($p<0.001$). Pearson correlational (r) analysis of the scores revealed a strong positive linear relationship between the two variables ($r=0.500$). This means that those who scored high in the psychological health assessment also obtained high scores in psychological health assessments. ($r=0.500$, $p=0.000$).

Test of significant relationship between scores obtained for psychological and environmental health also indicate that statistical significance exists between psychological health and environmental factors i.e. p-value = 0.000($p<0.001$). Pearson correlational (r) analysis of the scores revealed a strong positive linear relationship between the two variables ($r=0.500$). This means that those who scored high scores on psychological health assessment also obtained high scores on environmental health assessments. ($r=0.500$, $p=0.000$).

For the association between social relationship and environmental health the results showed that there is statistically significant association between the level of participant's social relationship and their environmental health after the analysis; and there was a fairly strong positive linear relationship between the two variables such that a higher score obtained on social relationship results in higher scores for environmental health as $r = 0.300$ and p-value= 0.000.

- **Descriptive Statistics for MetS Indicators**

Table 4.24: Descriptive Statistics for MetS Indicators (n=100)

	Minimum	Mean	Maximum	Standard deviation
Age	**27**	**51**	**65**	**8.7**
BMI	**21.2**	**33.8**	**64.1**	**6.4**
W C	**36**	**40.6**	**52.0**	**3.7**
FBS	**2.5**	**6.4**	**25.1**	**3.2**
HDL	**0.8**	**1.2**	**1.9**	**0.2**
TRIG	**0.6**	**1.1**	**2.1**	**0.3**
BP				

4.3.2.1.3 Welch Two Sample T-Test for Mets Indicators and QOL Domains

Table 4. 24: FBS and QOL Domains (n=100)

	High	Normal	T-Value	P-Value
Physical Health	**60.3**	**56.8**	**2.0**	**0.04**
Psychological Health	**61.8**	**60.8**	**0.5**	**0.6**
Social relationship	**52.9**	**48.0**	**1.5**	**0.1**
Environment Health	**62.1**	**56.8**	**2.3**	**0.02**

Table 4.25 shows that the average physical health for participants with high and normal FBS is 60.3 and 56.8, respectively. There was a statistically significant difference in physical health between high and normal FBS participants (t-value=2.00, p-value=0.04). Since the p-value is less than 0.05 we can reject the null hypothesis and conclude that the mean physical health for high and normal FBS participants is significantly different. The

result therefore suggests that participants with high FBS have statistically significant different amount of physical health from those with normal FBS. The average physical health for high FBS participants is 3.92857 more than the average physical health for normal FBS participants.

There was no statistically significant difference in psychological effect between high and normal FBS participants (t-value=0.50, p-value=0.60). The result suggests that participants with high -FBS do not have significantly different psychological effect from those with normal FBS. The average psychological health of the participants with high FBS and normal FBS are 61.8 and 60.8 respectively. There was no statistically significant difference in social relationship between high and normal FBS participants (t-value=1.50, p-value=0.10). The result suggests that participants with high FBS do not have significantly different social relationship from those with normal FBS. The average social relationship of the participants with high FBS and normal FBS are 52.9 and 48.0 respectively.

The average environment issue for participants with high and normal FBS is 62.1 and 56.8, respectively. There was a statistically significant difference in environment issue between high and normal FBS participants (t-value=2.30, p-value=0.02). Since the p-value is less than 0.05, we can reject the null hypothesis and conclude that the mean environment issue for high and normal FBS participants is significantly different. The result therefore suggests that participants with high FBS have significantly different amount of environment issue from those with normal FBS. The average environment issue for high FBS participants is 5.63658 more than the average environment issue for normal FBS participants.

- **HDL and QOL Domains**

Table 4. 25: HDL and QOL Domains (n=100)

	Abnormal	Normal	T-Value	P-Value
Physical Health	**58. 0**	**60.6**	**-1.3**	**0.2**
Psychological Health	**60.4**	**64.0**	**-1.5**	**0.1**
Social relationship	**49.4**	**54.3**	**-1.2**	**0.2**
Environment Health	**58.3**	**63.8**	**-2.0**	**0.04**

There was no significant difference in physical health between abnormal and normal HDL participants (t-value=-1.30, p-value=0.20). The result suggests that participants with abnormal HDL do not have significantly different physical health from those with normal HDL. The average physical health of the participants with abnormal HDL and normal HDL are 58.0 and 60.6, respectively.

There was no significant difference in psychological effect between abnormal and normal HDL participants (t-value=-1.5, p-value=0.1). The result suggests that participants with abnormal HDL do not have significantly different psychological effect from those with normal HDL. The average psychological effect of the participants with abnormal HDL and normal HDL are 60.4 and 64.0, respectively.

There was no significant difference in social relationship between abnormal and normal HDL participants (t-value=-1.2, p-value=0.2). The result suggests that participants with abnormal HDL do not have significantly different social relationship from those with normal HDL. The average social relationship of the participants with abnormal HDL and normal HDL are 49.4 and 54.3, respectively.

The average environment issue for participants with abnormal and normal HDL is 58.1 and 63.8 respectively. There was a statistically significant difference in environment issue between abnormal and normal HDL participants (t-value=-2.0, p-value=0.04). Since the p-

value is less than 0.05, we can reject the null hypothesis and conclude that the mean environment issue for abnormal and normal HDL participants is significantly different. The result therefore suggests that participants with abnormal HDL have significantly different amount of environment issue from those with normal HDL.

Table 4. 26: TRIG Glycerides and QOL Domains (n=100)

	High	**Normal**	**T-Value**	**P-Value**
Physical Health	**56.7**	**58.9**	**-0.8**	**0.4**
Psychological Health	**64.1**	**61.1**	**0.7**	**0.5**
Social relationship	**50.0**	**50.7**	**-0.1**	**0.9**
Environment Health	**61.3**	**59.5**	**0.5**	**0.6**

There was no statistically significant difference in physical health between high and normal TGL participants (t-value=-0.8, p-value=0.4). The result suggests that participants with high TGL do not have significantly different physical health from those with normal TGL. The average physical health of the participants with high TGL and normal TGL are 56.7 and 58.9, respectively. There was no statistically significant difference in psychological effect between high and normal TGL participants (t-value=0.7, p-value=0.5). The result suggests that participants with high TGL do not have significantly different psychological effect from those with normal TGL. The average psychological effect of the participants with high TGL and normal TGL are 64.1 and 61.1, respectively.

There was no significant difference in social relationship between high and normal TGL participants (t-value=-0.1, p-value=0.9). The result suggests that participants with high TGL do not have significantly different social relationship from those with normal TGL. The average social relationship of the participants with high TGL and normal TGL are 50.00 and 50.70, respectively. There was no statistically significant difference in environment issues between high and normal TGL participants (t-value=0.5, p-value=0.6). The result suggests that participants with high TGL do not have significantly different

environment issues from those with normal TGL. The average environment issue of the participants with high TGL and normal TGL are 61.3 and 59.5, respectively.

Table 4. 27: QOL Domains and METS Indicators (n=100)

DOMAINS	BMI		BP		AGE		EDUCATION		MARITAL STATUS	
	F-value	P-value	F-value	P-value	F-value	P-value	F-value	P-value	F-value	p-value
Physical Health	0.7	0.5	0.9	0.4	0.3	0.9	1.9	0.1	1.5	0.2
Psychological Health	0.7	0.5	0.01	0.9	1.3	0.3	3.9	0.01	1.7	0.1
Social Responsibility	0.02	0.9	0.2	0.8	2.5	0.04	1.2	0.3	1.7	0.1
Environmental Health	1.2	0.3	0.5	0.6	0.5	0.7	2.3	0.08	0.6	0.7

There was no statistically significant difference among the BMI categories regarding their physical health, psychological health, social responsibility and environmental health.

- **Age**

There was a significant difference in social relationship among the different age Categories (p-value=0.04). The results of a Tukey test revealed that there was a significant difference in social relationship between 30-39 and 60-69 age groups. There was no significant difference in physical health, psychological health and environmental health among the different age categories

- **Education**

There was no significant difference in physical health, social responsibility and environmental health among participants from different levels of education. There was a

significant difference in psychological health among the participants from different levels of education. From the results, it was revealed that there was a significant difference in psychological health between participants with primary education and secondary education.

- **Marital Status**

There was no significant difference in physical health, psychological health, social relationship and environmental health among participants from different marital status.

4.3.2.1.4 Integrated analysis and discussion of the Quality of Life and Focus Group Discussion

In the literature, the domains of quality of life have been used as nursing goals that focus on ensuring the attainment of optimal health of individuals, families and communities (Peterson & Bredow, 2009). It is in this context that the quality of life domain is used as predominant topic to usher in the discussion related to the emerging themes, categories and sub-categories of the aspects related to the opinions of the women about measures that could improve health. Therefore, in this section, the findings of the thematic content analysis of the focus group discussion is presented and discussed in relation to the associated quality of life domains. Related literature control for the qualitative component is also discussed.

The open coding method and the central question for the FGD: ‘’Please tell me the things that in your opinion contribute to personal health’’ served as a guide for the data analysis coding of the FGD data. Following the content analysis and comparison process, the emerging themes, categories and subcategories were reviewed to establish aspects of the women’s opinion about measures that could promote health in association with the physical, psychological, environmental and social domains of quality of life.

In all, four main themes, nine categories and 23 subcategories were identified from the thematic content analysis as shown in Table 12 below. The first theme concerned participants’ view about their quality of life. The second theme deals with awareness of the need for change in lifestyle. The third theme addressed the barriers inhibiting lifestyle changes among the market women from their own perspective, and the fourth theme also

addressed the market women's opinion about measures for lifestyle modification that can be taken to improve their health.

Table 4. 28: Themes, categories and sub-themes identified -Focus Group Discussion

Theme	Category	Sub-category
1. Quality of life	1.1 Physical health	-Physical symptoms -Increased body weight - Burn out
	1.2. Dietary pattern	- Late night eating - Healthy eating
	1.3. Exercise	- Walking -Skipping -Dancing
	1.4 Psychological health	Anxiety -Depression -Emotional stress
2. Barriers to Change	2.1Working conditions	-Time constraint -Late closure from work
	2.2 Eating habits	-Type of foods sold in the market -Impulse buying of foods -Work environment
	2.3 Social well-being	-Relationship with spouses - Family burden
3. Insight into lifestyle	3.1 Self-awareness	- Need for lifestyle changes - Need to educate friends and family
4. Lifestyle /behavior modification	3.2 Willingness to change	-Readiness to be educated -Initiative to change lifestyle -Spiritual faith in God

Table 4. 29: Combined results of the Quality of Life and Focus Group Discussion

QOL DOMAINS	Rating	Theme	Category	Sub-category
Physical domain	3	1. Quality of life	1.1 Physical health	-Physical symptoms -Increased body weight - Burn out
			1.2. Dietary pattern	- Late night eating - Healthy eating
			1.3. Exercise	- Walking -Skipping -Dancing
Psychological domain	1		1.4 Psychological Health	Anxiety -Depression -Emotional stress
Environmental domain	2	2. Barriers to Change	2.1Working conditions	-Time constraint -Late closure from work
			2.2 Eating habits	-Type of foods sold in the market -Impulse buying of foods -Work environment
Social domain	4		2.3 Social well-being	-Relationship with spouses - Family burden
		3. Insight into lifestyle	3.1 Self-awareness	- Need for lifestyle changes - Need to educate friends and family
		4. Lifestyle /behavior modification	3.2 Willingness to change	-Readiness to be educated -Initiative to change lifestyle -Spiritual faith in God

Description of Procedure for integrative analysis and discussion of Quality of life and Focus Group Discussion findings

- **Physical Domain**

Physical domain relates to participants' physical health, ability to do exercises as well as aspects that could have a positive or negative impact on the body**.** The results in Table 5.5 show that for physical health the mean score obtained was 58.7. This score was the second lowest, although the finding suggests that participants had an appreciable level of quality of physical health as accounted for by most of them scoring over 50% for this domain. This notwithstanding, 60% of participants indicated that they have been experiencing pain and discomfort, preventing them from functioning optimally. 26% stated they have to depend on medication in order to maintain their physical health (table 5). The results from the qualitative FGD analysis, revealed only one theme and three categories for the physical domain.

Theme 1: Quality of life.

Category 1.1 Physical Health

Three sub-categories were identified under physical health are: physical symptoms, increased body weight and burn out.

Sub - Category: Physical Symptoms

Participants stated that, they often experience physical symptoms which in their opinion, does not make them physically healthy.

A participant in this regard expressed that:

> '' *I was diagnosed of having diabetes two years ago, so occasionally I have numbness of my hands and feet and general bodily pains, and it makes me feel sick. So, I will say that my quality of life is not very good*" **(P3b).**

Another participant also had this to say:

> '*'Well, my little contribution is that lately I can see I am not very healthy. I have been experiencing aches and pains and numbness as well and I have been thinking it is due to old age, menopause and poor dieting''* **(P8b).**

Sub-category - Increased Body Weight

Participants also expressed worry and dissatisfaction about their body weight.

One participant stated that:

> '' *I will say that I am not very fit physically because lately I have seen that I have grown very fat and I easily get tired upon the slightest exertion. Occasionally I also experience bodily pains. I even planned going to the hospital before you came to do the screening for us so you have really helped some of us''* **(P5b).**

Another participant also expressed her frustration in this manner:

> '' *I will also say that now I can see that my body weight has increased and I easily get tired on the slightest exertion or the minimal activity I do. The thoughts about me being overweight makes me sick and depressed because my husband has been complaining about my weight a lot of late''.***(P5a).**

Sub - Category- Burn Out

Participants of the study again expressed being physically drained and exhausted on a daily basis because of the nature of their work.

Feelings of burn out or exhaustion was expressed by one participant as:

> *''Our work is very stressful. Every day you have to pack all your goods in the morning, unpack them at the close of day, and arrange them the next morning, hmm it's not easy. We all have the same problem as market women. We go through a lot of physical stress''* ***(P6b).***

Another participant clarified that:

> ***''*** *We stress ourselves too much …….yes auntie nurse, our work is very stressful. We normally sit down all day during market hours but it is a stressful work. Am saying this because you compete with others for your goods to be patronized, and if you don't make a lot of sales on a particular day, you become stressed out because you have dependents at home. We also wake up early to come and arrange and sell our goods so we don't*

get enough time to rest'' **(P2a).**

Category 1.2 Dietary Pattern

This category describes participants' opinions about dietary pattern that may help improve their health. Suggestions made by participants included: avoidance of late-night eating, eating of fruits and vegetables and avoidance of fatty foods.

Sub - Category: Late-Night Eating

This refers to participants' suggestions about the need to avoid late night eating which they think is a contributory factor ill health.

One participant asserted that:

> *''The first issue is about our diet. We should make sure we reduce our weight and avoid late night eating. By 6pm we should have finished eating our supper. Even if we will eat after 6pm it should be something light like tea, beverage or porridge''* **(P8a).**

Another participant further made this assertion:

> *''I also heard from the radio that late night eating can even lead to diabetes and heart attack. So, I think that we need to stop eating late. Even if we will eat late, we should wait for about two hours before we sleep or retire to our bed. We shouldn't go to bed immediately after eating''* **(P5b).**

A participant also stated that:

> *''Late night eating is also another thing that is killing us, because I learnt it can contribute to obesity and the development of diabetes. We should make sure we avoid it and even if we eat late, we should make sure we wait for some time before we go to bed''* **(P2a).**

Subcategory: Healthy Eating

This aspect relates to participants' opinions about how to improve their nutrition and the type of food to be eaten to promote their well-being. All 20 participants in both groups came up with various suggestions concerning this aspect.

A participant made this assertion:

''I think we should look at the food we take in or modify our diet because that is what is killing us. We need to reduce fat intake, avoid foods like fried egg and fried foods, meat, late night eating and too much sugary foods'' **(P1b).**

In support, another participant also stated that:

''We have to avoid the intake of too much fatty foods and meat. We should also try and eat fruits and vegetables. Even with the intake of fruits, I learnt we shouldn't eat too much ripped pawpaw, banana and pineapple because these can increase our blood sugar'' **(P2a).**

Another participant also had this to say:

''Another thing is the food we eat. We need to avoid eating heavy meal for instance instead of eating one big ball of kenkey, we can eat half. We also need to eat a lot of fruits and vegetables but in Ghana fruits are too expensive so I have been eating vegetables instead'' **(P6a).**

A participant also clarified:

''I think we need to eat a lot of fruits, eat a lot of fish especially dry fish like "Emane" to stay healthy, and drink a lot of soup too. We should also eat vegetables like carrot. Of late I have decided that every day I will make sure I eat fruits and vegetables. This morning for instance I has eaten pawpaw'' **(P2b).**

Category 1. 3 Exercise

Subcategory: Exercise (walking, skipping, dancing)

Almost all participants (18) spoke about the need for engaging in exercises and other physical activities to make them physically fit and improve their health. Participants shared their opinions about the exercises which they think are most appropriate for them. They therefore suggested various forms of exercises which they believe will improve their health and quality of life. Some participants were jovial and added a sense of humor to their presentations (some even danced to demonstrate that dancing is a good exercise) and this made the discussion lively.

One participant asserted that:

> *''We are very inactive therefore am of the opinion that we should do a lot of exercises in order to reduce our weight. We can even do some walking early in the morning before coming to the market or even play music and dance when we come to the market because I learnt walking is a very good exercise. This is the only exercise I can think of because by the nature of our work, we cannot get time to go to the gym or do a structured exercise''* **(P5a).**

A participant further clarified that:

''Occasionally we can get up and walk in front of our stalls or pace up and down. Those of us whose stalls are upstairs can also be climbing and descending the stairs, hmm but that one is a bit difficult oh. Even every morning after climbing the stairs to my stall, I become breathless. We can also dance… hahahaa (laughing). I learnt dancing is a very good exercise. I believe that is why they have even introduced ''di asa'' for market women. I learnt rigorous dancing is a very good exercise. I think I will end here for my colleagues to continue'' **(P8a).**

One participant also expressed her opinion as:

> *We have to be exercising as well. I learnt that exercise is good for the body. It improves blood supply in our system. We can even dance. The ''Di asa''' the Atinka TV introduced really helped. Those who participated in the competition, reduced in weight so we can do some dancing exercises. See I have started mine…… (Dancing*) **(P5b).**

The above statements made by participants indicate that although the average score for physical domain was above quite high, most of them often experienced physical symptoms such as bodily pains. Participants also had insight into practices that can may negatively or positively improve their health physically.

The results from the quality of life analysis and the focus group discussion in the current study showed that more than half of the participants reported frequently experiencing physical symptoms such as bodily pains. This result is similar to Tziallas et al. (2012)

whose results also revealed that there was no improvement in general of patients with MetS undergoing a therapeutic approach.

Similarly, Amiri et al (2014) also found out in their study that, there was a decreasing trend in the scores of bodily pain and general health among women with MetS. Compared with women without MetS, the odds ratio of reporting poor health related quality of life for women with intermittent MetS was high. The researchers further revealed that women with transient, intermittent and persistent MetS scored lower on the Physical Component Summary than those without the syndrome. Likewise, Nabamita & Dipayan (2018) in a recent study, also indicated that the subjects in e MetS group reported lower scores in almost all subscales of quality of life although their study was conducted among young adults.

The results of the current further revealed that participants were aware that lifestyle had a great impact on their health and is a contributory factor to the development of MetS. In line with this result, Nagahama et al. (2014) examined the association between self-reported eating rate and metabolic syndrome and the researchers indicated that eating rate was significantly and positively associated with metabolic syndrome. Nagahama et al. (2014) further posited that suggested that the association between eating rate and the presence of metabolic syndrome is largely accounted for by the difference in body mass. Similarly, Liu et al (2017) also averred that, individuals with light physical activity were more likely to have MetS and report poor health than those with vigorous physical activity. Again, Liu et al., stated that individuals eating poor diet had greater odds of developing MetS and reporting poor health. On the contrary, Dussaillant et al. (2016) found no association between food intake nor diet quality and metabolic syndrome prevalence. Thus, the researchers concluded that metabolic syndrome was highly prevalent among the Chilean elderly population but its prevalence was not associated with food intake or diet quality in this age group.

- **Psychological Domain**

This aspect refers to a person's emotional life and entails feelings, thoughts, beliefs, attitudes or deals with experiences relating to the mind or those that affect the mind. This

relates to participants who expression of mental and emotional factors and states which they think affect their health.

The results of the QOL survey in Table 5.12 shows that, the mean for Psychological Domain was 61.3%. This indicates that it is the highest positive rated quality of life although 27% of participants indicated that their psychological well-being was poor. The higher score for psychological domain is however inconsistent with the results of the focus group discussion as majority (60%) of participants indicated that they were psychologically and emotionally not sound. It is noted that from the qualitative analysis process some of the quality of life sub-categories are part of the psychological domain. The identified category is psychological health and the sub-categories are: Anxiety, Depression and Emotional Stress.

Category 1.4: Psychological Health

Sub – Category - Anxiety

Participants also expressed concerns about imminent danger or feelings of uneasiness in the mind that may have impart on their health.

Feelings of anxiety was expressed by one participant as follows:

> *'' School is about to reopen, and I have to pay school fees, hostel fees and all that, so you can't help but to keep thinking and you always become anxious when school is about to re-open. The fear of inability to pay your children's fees but am managing''* **(P2b).**

One participant further stated that:

> *''Our work is very stressful; you wake up early and set off to the market and we sometimes have to collect bank loans to expand our businesses and you always think about how to pay back this loan and a whole lot. Hmm it is not easy oh*'' **(P8b).**

Sub - Category – Depression

Participants expressed that they frequently experience sadness which they think affect their health. With some of them, it was evident from these unspoken words that they were

depressed especially those with financial burden but there was nothing they could do; than to just try and cope with the situation.

Feelings of depression was expressed by one participant as:

> *''Mentally sometimes when things are not going as expected you become depressed. Emotionally you become depressed especially on days that sales are very poor because you need money to cater for your family and other personal needs. So as for the mental stress it cannot be avoided''*. **(P8a).**

One participant also lamented:

> *''Apart from physical stress, I also experience emotional stress. Sometimes I become depressed because I am a widow and so am the bread winner for my family so I need to work hard to cater for my four children., and it is not easy''* **(P6a).**

Sub - Category: Emotional Stress

Participants also asserted that they often experience mood of hopelessness which affect their psychological health.

One participant had this to say:

> *'I go through emotional and physical stress because I am a single parent and I have to cater for my three children all by myself. When school re-opens, you have to start thinking about school fees, and two of my children are in the boarding house so you can imagine. It means I always have to work hard; so physically I become anxious and stressed out, and I think this is the reason why my B/P has been rising''***(P2a).**

Another participant also expressed that:

> *''Our work is very stressful oh my sister. You go through both physical and emotional stress. We overwork ourselves and sometimes if you don't make good sales, you tend to think a lot and become depressed. I am a single mother and I have to take care of three children so you can imagine''* **(P1b).**

The above expressions indicate that although psychological domain was the first highest positive rated quality of life, majority of participants had emotional and psychological challenges. However, it was observed that these psychological problems of participants were linked to job and family related issues. In line with the results of this study, Nabamita & Dipayan (2018) again revealed in their study that compared with men, women showed significantly lower values in Role emotional subscale. Similarly, Slagter et al (2015) also indicated that individuals with MetS had a higher likelihood of scoring poorly in the domains; general health, vitality, social functioning and role limitations due to emotional problems.

- **Environmental Domain**

This category relates to participants' expression of various sentiments about the effect of the nature of their work as well as working environment on their lifestyle and health. A vast majority of participants lamented that the conditions in the market prevent them from adopting healthy lifestyles making them vulnerable and affecting their quality of life.

The results from the qualitative FGD analysis again revealed the following as the social domain sub-categories: work environment, time constraint, late closure from work, type of foods sold in the market and impulse buying of foods.

Theme 3: Barriers to Change

Category 2.1: Working Conditions

Subcategory: Time Constraint

This relates to how participants expressed their views about lack of time due to the nature of their work, as a barrier to adopting healthy lifestyle practices.

A participant stated:

> *''I will say that my quality of life is not very good but I have been taking my medications just that I don't get time to go for hospital appointments because of my busy schedule. You wake up very early to come to the market and close late as well. It is only Sundays that I am free but I even have to go to church''* **(P3b).**

Another participant also said:

> *''Also we don't get time to cook our own meals because we are pre-occupied with trading activities. You have to wake up early and set off to the market and also work hard to cater for your family''* **(P6a).**

One participant also stated:

> *''My health status has not been very bad, but one thing is that, I don't go for check-up in the hospital because of my busy schedule at the market. Physically to me am fit just that even though Iam a diabetic, I don't.t normally get time for my hospital visits''*

Sub - Category: Late Closure from Work

This relates to participants' view about how late closure from the market negatively affect their eating pattern and health.

One participant lamented:

> '' *We close very late from the market and we have to eat our supper when we go home. We know it's not helping us but there is nothing we can do. But anyway, we will do our best to live healthy and change our eating habit*

Another participant also had this to say:

> *''Our main problem is late night eating because we close late from the market, and when you go home, you feel so hungry that no matter how late it is, you still have to eat supper''*

In the words of another participant she said:

> *''For me my number one problem is carbohydrate intake. I like carbohydrate foods like kenkey and banku a lot and I normally eat late because I have to eat after work when I get home and I learnt this practice is not good but I have no option because I always get home late around 7 or 7:30pm and I can't skip my supper too''*

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Category 2.2: Eating Habits

This category pertains to participants' opinion about hoe their eating habits affect their health and well-being.

Sub - Category: Type of Foods Sold in the Market

This concerns the opinions of the market women as regards the foods available in the market and its effects on their health and health promoting behavior. This was expressed in various ways by participants.

A participant stated that:

> *''Food vendors are always hovering around the market, and you can.t help but buy these foods, and some are not very healthy especially the pastries; meat pie, sausage rolls and other oily foods. It is not easy oh my sister, but we need to try our best''* **(P8a).**

Another participant also expressed that:

> ''*We should at least try and cook our own food and bring it along with us to the market because the types of food being sold in the market are not healthy at all. There is too much fat and oil and some too are very salty. All these are not good for our health''* **(P10b).**

One participant also said:

> *''Sometimes the kinds of foods we buy and eat here in the market are not healthy at all, so we need to look at the kind of food we eat. We have to avoid the intake of too much fatty foods and meat''* **(P2a).**

Subcategory: Impulse buying of foods

This category relates to participants' views about the availability of unhealthy foods and how they are compelled to buy these foods.

A participant stated:

> *''We normally eat snacks like dough nuts and meat pie, we know it is not good but we do it. As for our eating habits it is very poor, and it is not our fault because the market environment does not help us. There are a lot of food being sold in the market and you have no option but to buy so it's a big problem oh my sister''* **(P3b).**

One participant also said:

> *'' We sit at one place for long periods and sometimes you are also tempted to eat too much. Anything goes… because the foods are readily available. You see your colleagues buying so you are also tempted to buy''* **(P6a).**

In the words of another participant:

''In fact, the environment or situation at the market is another contributory factor to our poor eating habits. The food and snacks are always available in the market so we are always tempted to buy it. Sometimes you cannot help but just buy it and it's not helping us at all'' **(P9a).**

Sub - Category – Work Environment

Participants expressed that their working environment negatively affect their health

A participant stated that:

> '*'Hmm the market environment also doesn't help us at all. Food vendors are always moving from stall to stall and around the market with variety of foods and we are always tempted to buy and eat. Besides, we sit down for long hours without exercising so in fact we have a great task. God should be our helper''* **(P4a).**

Another participant also made this assertion:

> *'' The nature of our work and the environment is also not helping us at all. We sit down for long hours, without exercising and we eat in between meals a lot. We tend to buy any edible thing we see around, and you are tempted to eat unnecessarily even if you are not hungry. From pastries to sweets etc.***'' (P5a).**

One participant also stated:

> *''The environment in the market is a contributory factor. We sit at one place for long periods and sometimes you are also tempted to eat too much. Anything goes… because the foods are readily available. You see your colleagues buying so you are also tempted to buy''* **(P6a).**

The results of the focus Group Discussion revealed that participants expressed various sentiments about the effect of the nature of their work as well as working environment on

their lifestyle and health although, environmental domain was rated as the second highest rated domain with a mean of 59.66. According to the participants the availability and type of food sold in the market as well as busy work schedules and late closure from work predisposed them to diseases and affected their quality of life as well.

Consistent with the current study, Múnera et al. (2012) found out in a study that environmental risk factors such as increased consumption of calories, simple and complex carbohydrates were found to be associated with components of metabolic syndrome. The researches however stated that all these factors were directly related to the BMI. They thus averred that the metabolic syndrome only occurred in youngsters with obesity. In contrast, the level of physical activity, family history and personal risk factors showed no association. Múnera et al. (2012)'s results may be associated with the fact that their study was done among adolescents.

- **Social Domain**

  This category refers to the extent to which one feels a sense of belonging or one's relationship to society and its organizations.

  This relates to participants who stated that factors such as their work environment and family burden negatively affected their health. From the results, (n=15) of participants stated that their health is affected by the market environment, and family burden while (n=5) indicated they had no such issues.

  The results from the qualitative FGD analysis, revealed the following as the social domain sub-categories: Relationship with family and spouses, family burden, lifestyle changes, readiness to be educated, initiative to change lifestyle and spiritual faith.

Category 2.3: Social Well-Being

This category describes participants' opinion about their social wellbeing and health.

Sub - Category – Relationship with Family and Spouses

Participants in this study, expressed concerns about relationship with spouses and its effect on their quality of life.

A participant stated:

''I'm now not very active in bed like I used to and my husband has been attributing it to my weight. (Laughing) and it bores me sometimes so I also retaliate and it creates misunderstanding between us but am managing. It makes me suspect that he is cheating on me and I sometimes fear he may leave me for another woman'' **(P5a).**

In the voice of another participant:

''My family members and husband have been complaining that I have put on weight, so I seriously need to do something about it. You know men of today. They don't like fat women so if you don't take care your marriage will even be affected. Your husband will go after other women because of your size'' **(P1b).**

Sub - Category: Family Burden

With regards to social well-being, participants expressed that they are often over- burdened with family commitments and this affect them negatively

One participant stated that:

'' I am also the first born among five siblings and sometimes my extended family members also come with their problems and I have to help in that regard. So, I will say stress is my number problem'' **(P6a).**

Likewise, another participant also stated:

*''Hmm madam, now my business is not flourishing as it used to be and of late sales are also not good at all. Besides, my husband has lost his job so I am the one taking care of our two children at the University, so you can imagine.''***(P2b).**

Theme 3: Insight into Lifestyle

Category 3.1: Self Awareness

Three sub categories emerged from this category and this include: need for lifestyle changes, and need to educated family and friends.

Subcategory - Need for Lifestyle Changes

Participants were observed to be well informed about their current state of health and could recognize the need for modification of their lifestyle in order to improve their quality of life. This was expressed in various ways.

One participant stated that:

> *''My only problem is that I don't normally go to the hospital when I am sick. I only buy over the counter drugs at the pharmacy shop but now I have advised myself. I also eat a lot of sweets like ice creams and soft drinks like Fanta but I have stopped all these practices now''* **(P7a).**

Another participant further clarified that:

> *''I have reduced my sugar intake and I don't always take too much fatty foods and I also make sure I don't eat very late at night and I have reduced my carbohydrate intake too, so am trying my best my sister. Now I am also careful about eating in between meals. Before I used to buy and eat anything at all that passes by ranging from sweets like ''ayigbe toffee'', meat pie, sausage kebab and other types of food but now am making conscious effort to stop that practice''* **(P1a).**

In the words of another participant:

> *''I will say am somehow satisfied with my quality of life but I eat sweets a lot. I like chocolate and toffees so every day I eat some when I come to the market. Now that I have been told that my blood sugar is high, I have decided to stop those practices''* **(P9a).**

Sub - Category: Need to Educate Friends and Family

Participants who expressed their readiness to educate colleagues, friends and family about healthy lifestyle that will help improve their health status.

A participant made this statement:

> *''The screening has really put me on my toes. Now I have started changing my lifestyle especially eating habits and I have also been advising my siblings at home and my colleagues at the market to change their lifestyles as well because our health to me is very important''* **(P10a).**

One participant also asserted that:

> *''Now I don't even eat sugar at all because my life is very important to me. I want to live longer and take care of my children. I will also entreat my sisters working here in the market to take good care of themselves to live long''* **(P1a).**

Another participant also stated:

> *''In fact I have learnt a lot so am seriously working on my health, and I have also started educating my siblings and close friends about how to take care of their health to live long. Thank you very much''* **(P4a).**

A participant also revealed that:

> *''I will entreat all my colleague market women to adhere to whatever you tell us because you are really helping us. We don't even have time to go to the hospital when we are sick. We just buy over the counter drugs from the chemical shop''* **(P1b).**

Theme 4: Lifestyle and Behaviour Modification

Category 3.2: Willingness to Change

This emerging category relates to interest in committing to important actions relating to changing behaviour, preparedness or eagerness to change. Participants expressed their readiness and eagerness to change their lifestyle and also adhere to health education as regards their lifestyle changes in order to improve their health. Most of them stated they had started taking the initiative. They also had a spiritual believe in God that he could help them to adhere to positive lifestyles.

Sub - Category: Readiness to be Educated

This subcategory relates to how participants expressed their preparedness to adhere to health promoting behaviors and health education**.**

This was evident in the words of a participant**:**

> *'' I would like to commend you and your team for the good work you are doing. Thank you so much for making us aware and prompting us to take*

care of our health. We are ready to do whatever you tell us to do. Thank you'' **(P10a).**

Another participant also asserted**:**

''Please come to our aid and help us out. You also need to prescribe medication for us to buy especially those of us who have problems you should also give us tit bits and education on how we can live our lives to stay healthy. Please help us and direct us as well and we will do as you say'' **(P10b).**

A participant further asserted that:

''*I think we have said more than enough so it is now your turn to educate us. You have to be visiting us occasionally. In fact, you need to help us oh my sister. I will also like to thank you and your team for your time and patience''* **(P5a).**

Sub - Category: Initiative to Change Lifestyle

This emerging category relates to participants' expressions about the actions and steps they are taking to modify their lifestyle in order to improve their health.

One participant averred:

''It is about self-discipline and change in lifestyle. Now am making conscious effort. Since you people came to check our cholesterol and sugar, I have stopped late night eating. I always make sure I eat in the market before I close and go home. Sometimes too when I don't eat in the market, I just take tea or porridge or something light maybe fruits or tom brown. I have stopped eating heavy foods at night'' **(P6b).**

A participant also expressed that:

''Now I don't eat meat at all and I have started exercising too. I also make sure I eat fruit and vegetables so this is my resolution now. We have to live long because we have children and dependents to cater for'' ''Now am also making a conscious effort and trying my best especially with my

diet. I have decided to change my eating habit especially late-night eating'' **(P3a).**

Another participant also had this to say:

''My doctor told me exercises help to reduce our B/P because it improves blood supply, so now I have started exercising. I walk to the bus stop which is a bit far from my house every morning. Formerly, I used to stand in front of my house to pick a car to the station, before I finally board one to the market'' **(P8a).**

Sub - Category: Spiritual faith

This subcategories centers on how participants expressed their belief that God is capable of helping them adopt healthy lifestyles in order to promote their health. Participants expressed a dependency on God to help them in this regard**.**

One participant asserted:

*''I only pray that God should help us to change our eating habits and lifestyles, because that is our only problem. Our health is very important because we need to have quality lives to be able to work and cater for our children. Thank you***'' (P9a).**

Another participant stated:

''I will only say that we will try our best to change our lifestyle, it is not easy oh God should help us. Hmmm… Thank you very much for the assistance. In fact, you are doing a great job. Initially I was reluctant to participate because other people do come to do health screening and they don't even bring the results. So, you and your team have done well'' **(P3b).**

A participant also said:

'' For me I have already told you am a woman of few words. My prayer is that we do our best to live healthy lives so that God will also do the rest. Thank you so much'' **(P3a).**

Participants expressed a dependency on God to help them maintain a healthy lifestyle**,** their readiness to change their lifestyle and also adhere to health education on health promotion

in order to improve their health. This finding is consistent with VanWormer et al (2017) who indicated that the primary predictor of MetS prevention was change in optimal lifestyle score based on four behavioral risk factors, including smoking, alcohol use, fruit/vegetable consumption, and physical activity. The researchers further asserted that as compared to improving poor lifestyle habits, maintaining a healthy lifestyle seemed to be most helpful in avoiding metabolic syndrome over the two-year study timeframe.

The analysis also revealed that social domain was the least rated quality of life domain with a mean of 50.67, although none of the participants stated they have very poor social life. However, quite a number of participants stated that they have poor sexual life. This result is consistent with Otunctemur et al. (2015) who also indicated that sexual dysfunction is more prevalent in pre and postmenopausal women with the metabolic syndrome. In similar context, Amidu et al., in a study conducted in Ghana also brought to fore that generally, Sexual Dysfunction as well as its sub-scales correlated positively with age, blood pressure, duration of diabetes and MetS score. However, their study unlike the current study was done among diabetes patients with MetS.

4.3.2.1.5 Researcher's Reflections

During the interview sessions, the researcher felt comfortable, mingling with the market women and enjoyed the discussion with the women as they wholeheartedly shared their views with jokes and examples.

Perception about Interviewees

Most participants were reluctant in bringing out their views during the discussion sessions, since they were o the view that as a nurse the researcher had to rather educate them and not engage in a discussion with them, and therefore saw the discussion as a bother. However, some were willing to participate and showed keen interest in the discussion. The researcher also observed that Participants who had knowledge about research were eager and ready to be involved in the research. Some were also relaxed and felt comfortable probably because they knew as -a nurse the researcher can help relieve them of their problems. All the participants

had a fair idea about healthy living, and mentioned the need for diet and lifestyle modification, but they seemed not to have much control on their lifestyles.

Participants also comported themselves very well. Anytime a participant is sharing her views on the topic under discussion, the others did not interrupt but listened attentively. This behavior also stems from the traditional Ghanaian custom of showing reverence to people with authority and listening without interruption when an elderly person or a person of a higher authority is talking. Generally, the FGD was very successful, all participants contributed meaningfully to the discussion, and they enjoyed the session, however they all seemed to be in a hurry to go back to their stalls and sell. Notwithstanding the few problems encountered, the discussions were very successful and therefore the researcher could achieve the objective of the study.

4.3.3 SUMMARY

This section described studies three and four which are the quality of life of market women identified to have MetS, as well as a focus group discussion describing the women's informed views practices and measures contributing to improved health outcomes. The emerging categories from the qualitative study, were merged with the results of from the QOL study. The market women expressed various views and suggestions about practices that may result in positive health outcomes. These suggestions were adopted as part of the processes for designing a MetS intervention programme for the women.

4.4 SECTION C

METABOLIC SYNDROME INTERVENTION PROGRAMMES: AN INTEGRATIVE LITERATURE REVIEW

This section is part of Phase 1, described as the situational analysis phase. The results from the MetS prevalence and knowledge surveys conducted showed that a considerable number of market women (n = 268, 77%) were either MetS positive or at risk of developing MetS. The results further showed the market women's overall knowledge of MetS score was 41%. The obtained results in this study justify the need for MetS intervention for the Kaneshie market women.

It is in this context that the researchers included integrative literature review as part of the situational analysis phase to explore existing MetS intervention programmes. A detailed account of the research design and methods employed in conducting the integrative literature review are outlined.

An integrative review is a specific literature review method that has the potential to build on nursing science, informing research, practice and policy initiatives (Broome, 1993) alluded in Whittemore & Knafl (2005). Broom (1993) further stated that integrative review encapsulates past practical or theoretical literature to provide a more comprehensive understanding of a particular phenomenon or health care problem. In addition, steps in an integrative review consists of a systematic search, categorization and analysis of past qualitative and quantitative research studies on the subject being studied (Whittemore & Knafl, 2005).

Integrative reviews furthermore, are considered as a contribution to the presentation of varied perspectives on a phenomenon of concern and has been advocated as important to nursing science and nursing practice (Kirkevold 1997, Estabrooks 1998 and Evans & Pearson, 2001). Hence, the researcher in the current study deemed it appropriate to use integrative literature review.

An integrative review was applied in this study in order to explore documented MetS intervention or health promotion programmes, which will inform the development of a

similar programme for women with metabolic syndrome in Ghana to help improve their quality of life.

4.4.1 Purpose of the Integrative Review

In this study, the conduct of an integrative review was aimed at exploring available literature concerning intervention programmes, or health promotion programmes for improving health outcomes and preventing the increased incidence of metabolic syndrome, between 2007 and 2017.

4.4.2 Research Design and Methods

The five stages of conducting an integrative literature review as described by Whittemore and Knafl (2005) were implemented in this study.

The first stage is problem identification or formulation as well as development of the integrative literature review question. The second and the third stage entails description of the literature search process, followed by description of data retrieved. The fourth and fifth stages entail the data analysis and the presentation of the results.

4.4.2.1 The Five Stages of Conducting an Integrative Literature Review

4.4.2.2 Problem Identification and Question Formulation Stage

Literature evidence has shown that Mets is on the increase. Global estimates of metabolic syndrome projected a about 20–25 percent prevalence (Kassi et al, 2011)**.** The risk of cardiovascular diseases, coronary heart problems, diabetes type II and stroke increase in MetS (Arthur, et al, 2013). The etiology of MetS lack clarity and specificity, but it is associated with diet, physical inactivity and visceral obesity (Kaur, 2014). According to Grandner et al (2012), intervention or wellness programmes can be developed for individuals with MetS to improve their health-related quality of health.

An intervention study is intended to help improve the condition of individuals, or a group of people, and also evaluate the impact of a programme (Thiese, 2014). The development of health promotion programme contribute towards improving health outcomes and the quality of life (QOL) of women with metabolic syndrome (MetS).

It is in this context that the researcher formulated this question: What are the research studies available on metabolic syndrome intervention or health promotion programmes for improving the health outcomes of people with metabolic syndrome?

4.4.2.3 Literature Search Stage

In this study, a comprehensive computer assisted literature search was done to retrieve information from eligible primary studies. According to Whittemore and Knafl (2005), the most convenient form of literature search is a computerized search where the search terminologies are consistent and properly combined.

To ensure that search strategies were rigorous, an experienced University librarian was first consulted. The keywords and syntaxes were then determined in consultation with the librarian with a consideration of a broad range of constructs used in the field of intervention, health promotion and wellness programme with the following variables: metabolic syndrome and obesity and risk for heart diseases. Thus, the search had specific focus on intervention for metabolic syndrome as related to health promotion or wellness programm**e.**

The literature review was done with the supervision of researcher's supervisor as well as experts with experience in integrative literature review. The researcher and her supervisor as well as an independent reviewer assessed the eligibility of each study used and agreed on all articles appraised.

A purposive sampling was done to identify eligible primary sources. The study had no participants; hence consent was not obtained. Regular scholarly searches were conducted to ascertain the nature of the problem for a whole year (from January to December, 2017).

4.4.2.3.1 Search Strategies used for the Study

In order to obtain credible information from the regular searches, the following key strategies were employed; searching from credible sources for literature, making use of key works, and taking into considerate the inclusion and exclusion criteria and selection process.

4.4.2.3.2 Sources of Literature

Multiple sources of relevant literature such as; CINAHL with full text, PubMed and Biomed Central were used.

4.4.2.3.3 Search Terms/Keywords

The search terms or keywords for this review were as follows:

Intervention OR wellness OR health promotion programmes AND metabolic syndrome OR risk for cardiovascular diseases.

4.4.2.3.4 Inclusion and Exclusion Criteria

Inclusion Criteria

Researches done from year 2007 to 2017 written in English were selected for the literature review. These researches specifically addressed intervention, wellness or health promotion programmes and metabolic syndrome or risk for cardiovascular diseases.

Exclusion Criteria

Articles which had intervention or health promotion programmes that were designed for other medical conditions or diseases such as chronic kidney, and liver diseases, and cancer rather than metabolic syndrome were excluded. Intervention programmes for most of the rejected research reports also focused on drug therapy rather than wellness programme. Dissertations, discussion papers and expert opinions and reports older than year 2007, as well as articles published in other languages other than English were excluded. A data extraction sheet was designed in order to file the required information from each research paper reviewed. The information included the journal of publication, year of publication, authors, type of research methods or design used, type and duration of intervention and effect of the intervention employed in the study (Refer Appendix 11).

4.4.3 Data Collection Tool

In this study, Sparbel and Anderson (2000)'s Data Collection Tool for integrative literature Reviews was used as a guide in gathering data for the integrative literature review

Table 4. 30: Data Collection Tool (Sparbel and Anderson (2000)

Researchers	
Year of study	
Journal where published	
Title of study	
Purpose of the study	
Study Focus	
Conceptual model	
Research question/hypothesis	
Aspects of clinical nursing addressed	
Type of research design	
JBI level of evidence	
Sample size and sampling method	
Number of subjects in the study	
Data collection tools used	
Main outcome	
Data analysis methods	
Validity	
Key findings	
Remarks	

Table 4. 31: Data Evaluation Stage

All articles underwent a secondary review by an independent reviewer. The total number of articles retrieved was (n=91). Table 4.31 is an indication of the search engine used, the total number of articles retrieved and the number of duplicates excluded.

Table 4. 32: Article Search and Selection Process

	PUBMED	**CINAHL**	**BIOMED CENTRAL**	**TOTAL**
Records identified by databases searching - 91	33	21	37	91
Records after duplicate has been removed:	28	17	25	70

The data retrieved were displayed using the preferred system of reviews (Prisma, 2009 Flow diagram as shown in the figure below).

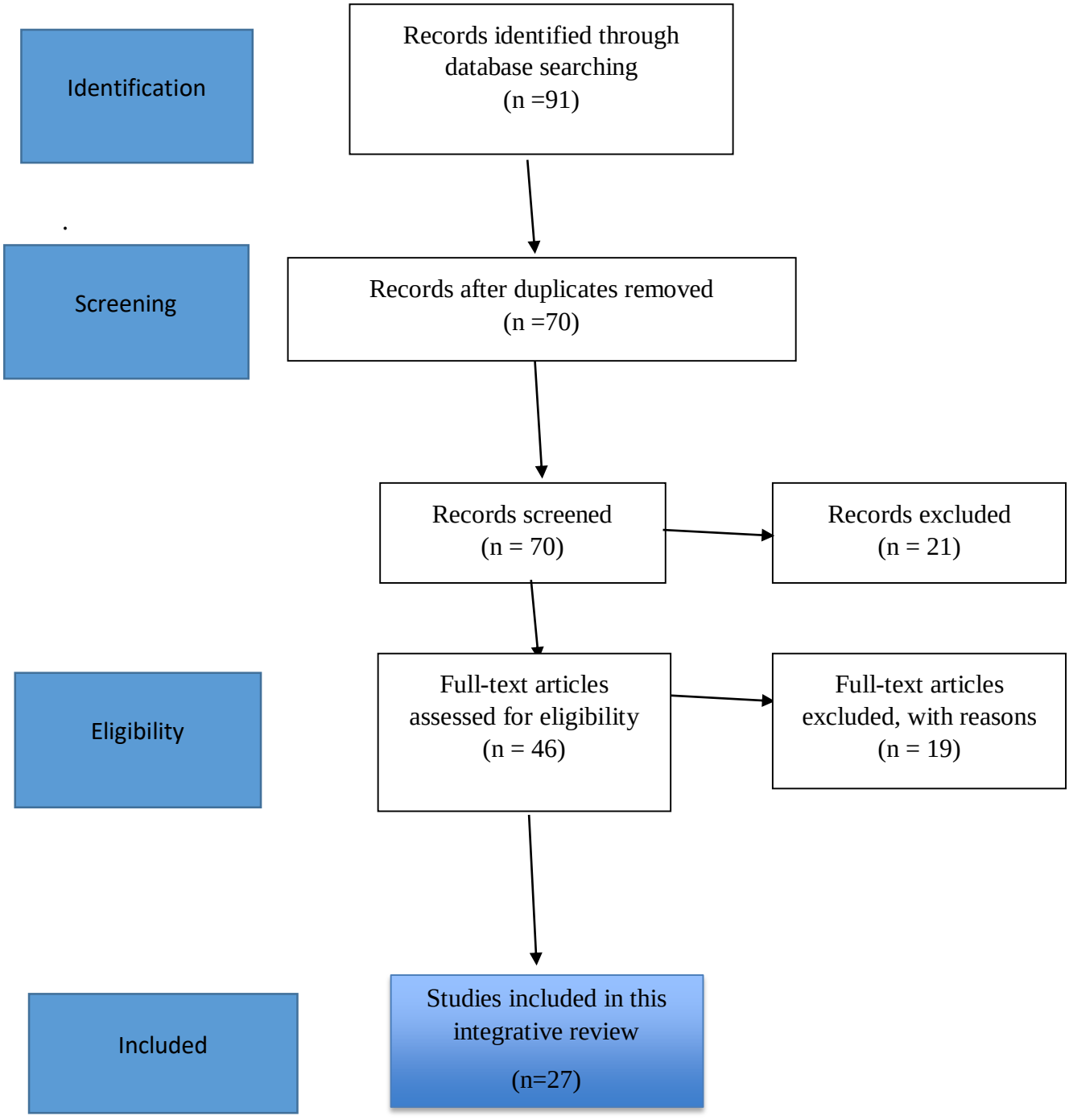

Figure 4. 20: Flow Diagram of the Search and Selection Process for the Included Studies

4.4.5 Data Analysis

Data analysis involve a systematic organization and synthesis of data to generate evidence (Polit & Beck, 2012)**.** The processes involved in data analysis for an integrative review include; coding, categorizing and summarizing data. Thematic analysis involves a constant comparison of data, which include patterns, themes, variations and relationships are detected in the extracted data (Whittemore & Knafl, 2005).

Whittemore and Knafl (2005) outlined ten (10) components of thematic data analysis, comprising: recognizing patterns and themes, identifying plausibility, clustering, counting, contrasting and comparing, discerning common and unusual patterns, subsuming particulars into generalities, identifying relationships between variables, finding intervening factors, and building a logical chain of evidence.

This study employed the use of thematic content analysis to analyze the data. Data from primary sources were ordered, coded, categorized and summarized into a whole and the results were used to draw conclusions about the research problem. Articles retrieved during the search were reviewed independently by the researcher, the supervisor and a research mentor. List of publications from the databases and other searches were reviewed and publications such as literature review, dissertations, clinical reports, discussion papers and editorials were excluded. Only outputs of published researches were finally captured.

Abstracts of all papers included in the study were obtained to first review titles and determine whether the intervention was designed for metabolic syndrome especially in cases where title was not clear. Full text articles were then used to review the study, using the data extraction sheet.

4.4.5.1 Data Reduction

In this review, data was reduced into research design categories such as experimental and quasi experimental. According to Whittemore and Knafl (2005), data can be reduced into various sub-groups in a logical manner based on either identified characteristics such as type of design, setting, sample characteristics, or on a predetermined conceptual classification of participants. The data which is classified is then extracted, coded and

grouped into a framework in data matrix or spreadsheet. This makes it easy to compare articles with each other based on given characteristics such as concepts, methodology etc.

4.4.5.2 Data Display

Following data reduction, data assembling occurs with diverse primary sources being grouped around particular variables or subgroups (Whittemore & Knafl, 2005). In this study, data was displayed in a table to allow for comparison of the extracted data from the primary studies. This enabled the identification of patterns and relationships within primary data sources, and this led to the development of themes.

4.4.5.3 Data Comparison

Data comparison is characterized by interactively examining data displays noting patterns, relationships or themes in primary source data (Whittemore & Knafl, 2005). In this review, data comparison was done to provide clarity to the empirical and theoretical support emerging from the interpretations. Similar constructs were grouped together and a temporal order was displayed.

4.4.5.4 Conclusion and Drawing Verification

The final phase of analysis involves subsuming the specific classifications into general constructs (Whittemore & Knafl, 2005). The patterns identified in this study were grouped into themes and sub- themes for critical data comparison and drawing conclusions. These were continually reviewed in other to ensure inclusiveness of all the sources. All outcomes were compared in relation to pattern relationship, themes or conclusion to ensure accuracy and confirmability (Whittemore & Knafl, 2005).

4.4.6 PRESENTATION STAGE

In this phase, the findings of the integrative review are presented based on the following criteria: Type of journals in which the studies were published, year of publication, types of research design/sample size, and ages of participants used, Levels of evidence provided in the studies and the countries in which the studies were conducted**.** The main themes and subthemes emerging from the analysis of the various studies with regards to MetS interventions are also described.

4.4.6.1 Type of Journals

Table 4. 33: Types of Journals in which the Articles Were Published (n=27)

Journal	Number of studies published
Journal of applied physiology, nutrition and metabolism	**5**
Journals of nutrition, diabetes and metabolism.	**6**
The South African Medicine journal (SAMJ)	**1**
The South African Journal for research in sports education and research (SAJ SPER).	**1**
The journal of Canadian academy of sports medicine	**1**
Journal of general internal medicine	**1**
Journal of Cardiologia	**1**
Biomedical journal	**1**
Journal of immigrant and minority health	**1**
Journal of public health and research perspectives.	**1**
Other health related and sports journals	**8**

The majority of the articles published (11) were retrieved from the journals of nutrition, diabetes and metabolism. Out of this number, 5 were published in the journal of applied physiology, nutrition and metabolism. The remaining 16 publications were from other health related and sports journals other than nutrition and metabolism. Notably among these were publications from: Two South African journal: The South African Medicine journal (SAMJ), and the South African Journal for research in sports education and research (SAJ SPER). Other journals included: The journal of Canadian academy of sports medicine, Journal of general internal medicine, journal of Cardiologia, Biomedical journal, Journal of immigrant and minority health and journal of public health and research perspectives.

4.4.6.2 Year of Publication

A greater number of the researches for this review were published between year 2012 and 2017(n= 20), whiles the remaining articles (n= 7) were published between 2007 and 2011.

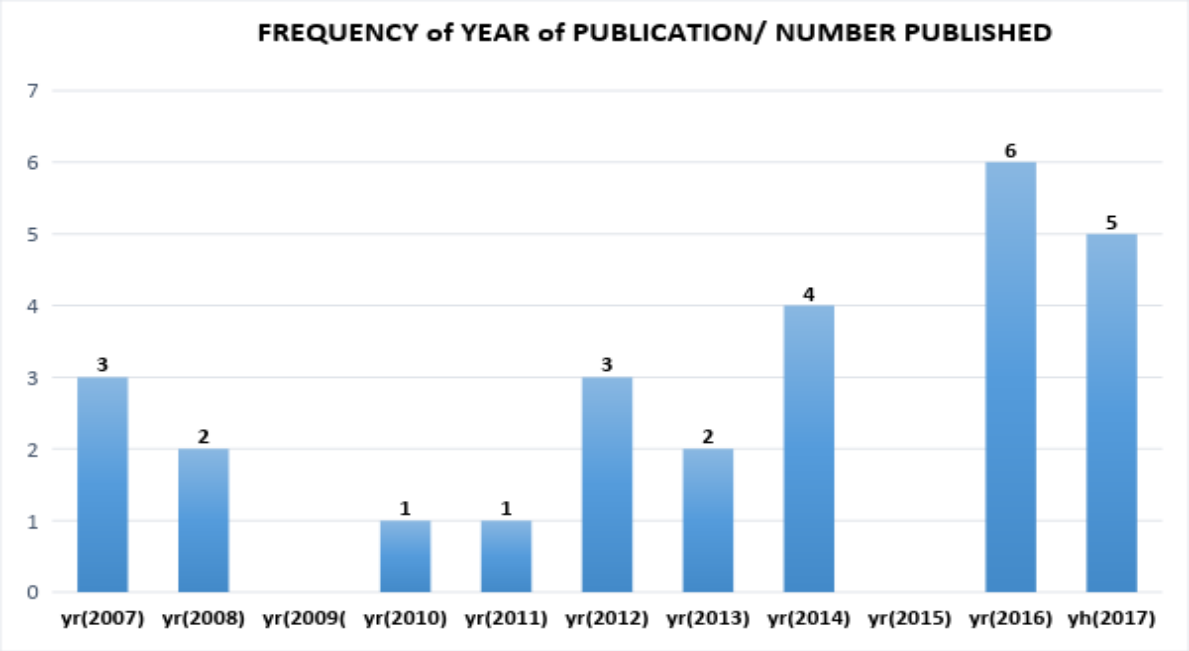

Figure 4. 21: Year of publication of Articles

4.4.6.3 Types of Research Design/Sample Size, Age Range of Participants

Table 4. 34: Type of Research Design and Age Range of Participants

Types of Research	Number used
Quantitative only	26
Qualitative only	None (0)
Mixed (Both Quantitative and qualitative Research designs)	1

26 out of the 27 researches used in this review were quantitative studies and followed the tenets of a quantitative research, while 1 was a mixed method research. The mixed method

research employed the one group pre and post-test design for the quantitative strand, and the interviewing method for the qualitative strand. A sample of 10 participants were drawn from the same sample used for the quantitative study and interviewed as part of the intervention.

None of the researches was a qualitative only study. Majority of the quantitative researches (20) were randomized control trials; participants were randomly selected through simple random, stratified and cluster random sampling and the studies entailed the use of intervention and control groups. Out of this, 19 were two-armed (2-group) randomized control trials, while one (1) was a three (3) group randomized control trial. 7 of the researches were one group, pre and post-test studies. Only one of the studies was a mixed method study.

The sample size for the researches used in this review ranged from 10 to 24, 178 Participants. The researchers followed the methodology and tenets of quantitative and mixed methods designs respectively. 6 of the researches used for this review were done among only women, I among only men, only 1 was done among adolescents, while the remaining 19 were done among male and female adults. The age range of participants was 15-78, with a mean of 46.5.

4.4.6.4 Levels of Evidence Provided in the Studies Included in this Review

The term 'evidence' in Joanna Briggs Institute (JBI) systematic reviews mean the basis of belief, i.e. the validation or corroboration that is needed to prove that something holds some amount of definite true. But then, the nature of the evidence needed is dependent on the nature of the study and the purpose from which it is performed. Joanna Briggs Institute (JBI) reviews made attempts to categorize these levels according to its feasibility, appropriateness, meaningfulness, and effectiveness (Refer Table 6.5). JBI quantitative reviews focuses on evidence of "effectiveness". This is the extent to which an intervention, will produce the desired results for which it was designed, when used appropriately, (Joanna Briggs Institute, 2011).

Levels of evidence are important in any research being undertaken as it indicates whether the research is reliable and trustworthy, and can be used in practice (Rich, 2005). The level

of evidence of each study was assessed according to the JBI Levels of Evidence (2014) as listed in Table 4.35 below. According to JBI, level I (experimental studies) are the strongest and level V (expert opinion or bench research) are the weakest in terms of level of evidence. Levels I and II are generally considered strong. The strength of evidence also reduces in alphabetical order within each category so that levels labelled 'a' are the strongest and those labelled 'e' are the weakest. Majority of the studies had a strong level of evidence. 74.1% (20) of the studies were randomized control trials and were at level 1c. The remaining studies used for the review 25.9% (7) were one group pre and posttest studies and were at level 2 d (Table 4.35).

Table 4. 35: Joanna Briggs Institute (2014) Levels of Evidence

	Type of study	**Number of Articles**
Level I	Experimental studies	
Level 1a	Systematic reviews of Randomized controlled trials (RCTs)	
Level 1.b	Systematic reviews of RCTs and other study designs	
Level 1.c	Randomized controlled trials	20(74.1%)
Level 1.d	Pseudo-randomized controlled trial	
Level II	Quasi-experimental designs	
Level 2.a	Systematic reviews of quasi-experimental studies	
Level 2.b	Systematic reviews of quasi-experimental studies and other lower study designs	
Level 2.c	Quasi-experimental prospectively controlled study	
Level 2.d	Pretest – posttest or historic/retrospective control group study	7(25.9%)
Level III	Observational analytical designs	
Level 3.a	Systematic reviews of comparable cohort studies	
Level 3.b	Systematic reviews of comparable cohort studies and other lower study designs	

Level 3.c	Cohort study with control group	
Level 3.d	Case-controlled study	
Level IV	Observational descriptive studies	
Level 4.a	Systematic reviews of descriptive studies	
Level 4.b	Cross-sectional study	
Level 4.c	Case series	
Level 4.d	Case study	
Level V	Expert opinion and bench research	
Level 5.a	Systematic review of expert opinion	
Level 5.b	Expert consensus	
Level 5.c.	Bench research/single expert opinion	

Source: Joanna Briggs Institute. (2014). The Joanna Briggs Institute Reviewers Manual 2014 Edition.

4.4.6.5 Countries Where the Researches were Carried Out

Eight (8) of the researches used for this integrative review were conducted in the North America (USA and Canada), 1 in South America (Brazil), 2 in the Oceania Sub-Region (Australia), 7 were conducted in Europe (UK, Switzerland, Italy, Poland, Norway), 7 in Asia (Vietnam, Thailand, Korea, Pakistan and Iran), while one was conducted in Africa (South Africa).

Below are the countries with number of intervention studies done.

Table 4. 36: Countries where Researches were Carried Out

CONTINENTS	COUNTRY	NUMBER OF RESEARCHES
North America (n=8)	USA.	6
	Canada	2
Europe (n=7)	United Kingdom	2
	Norway	2
	Italy	1
	Switzerland	1
	Poland	1
Asia (n=8)	Vietnam	2
	Pakistan	1
	Korea	2
	Iran	2
	Thailand	1
South America (n-1)	Brazil	2
Oceania Sub-Region (n=2) (Australian continent)	Australia	1
Africa (n=1)	South Africa	1
	Total	27

4.4.7 THEMES AND SUB-THEMES EMERGING FROM THE DATA

4.4.7.1 Introduction

In this study, coding and categorization was done in analyzing the intervention or health promotion programmes used by other researchers for improving the health outcomes of individuals with MetS. From the analysis, three main themes and ten sub-themes emerged. A summary of the various themes and sub-themes has been presented in Table 6.7, and explanations given to that effect.

Table 4. 37: Themes and Subthemes from the Analyzed Data

Themes	Sub-themes	Number of articles
1. Type of intervention	1.1Combination of Physical activity and diet	17
	1.2 Physical activity only	8
	1.3 Diet therapy only	2
2 Duration of intervention	Less than 3 months	3
	3months	10
	Less than 6months	1
	6months	6
	More than 6 months	7
3. Effects of the intervention	Reduction in metabolic syndrome parameters/cardiovascular risk factors	All the 27 articles reviewed revealed a reduction in metabolic syndrome parameters as well as reduction in MetS complications
	Reduction of metabolic syndrome complications	

4.4.7.2 Theme 1: Types of Interventions

Three Sub-Themes Emerged from this Theme namely:

Table 4. 38: Sub-Themes

Physical activity and diet	**17**
Physical activity only	**8**
Diet therapy only	**2**

All the interventions done in the 27 researches used for this review, were centered on life style modification namely; diet and exercises therapy, two of the studies also included avoidance/ reduction in alcohol intake and smoking, in addition to the diet and exercise therapy. 16 of the studies employed a combination of diet and exercise therapy, 8 were physical activity (exercise) only, and 3 were only diet intervention. Some of the interventions were multi-component. Participants were involved in group and community based physical activity interventions and also had education and counselling sections on weight control and lifestyle changes (dietary guidelines and physical activity behaviors)

Booklets and pamphlets with guidelines for health improvement were also distributed among participants, for self-monitoring.

Majority of the interventions were practical based and were done under supervision and entailed a face-to face interaction, some were both theory and practical based, whereas some were only theory-based interventions. Eleven (11) of the researches were community and group based, while 16 were individual and home-based interventions.

4.4.7.2.1 Sub-Category 1: Combination of Diet and Exercise Therapy (Multi-Component Intervention)

Saboya et al (2016), carried out a study in Brazil with the aim of comparing the effects of three types of approaches for lifestyle change programs in the reduction of metabolic parameters, and to identify its impact on the quality of life (QOL) of individuals with MetS. The researchers employed a randomized controlled trial among MetS positive individuals aged 30-59 years. The participants were randomized into three groups of multidisciplinary intervention for a period of 12 weeks. The primary outcome of the intervention was change in MetS parameters and the secondary outcome was improvement in QOL measures. The study revealed that group and individual interventions could contribute to a significant reduction in BMI, waist circumference, and systolic blood pressure at 3 months. The QOL of participants also improved significantly.

The researchers concluded that; a group intervention which is multidisciplinary in nature might be an effective strategy in controlling MetS parameters of MetS and improving quality of life. In another study, Blackford et al., (2016) also explored the effect of a 6-month lifestyle intervention program comprising of diet and physical activity behaviors in reducing the prevalence of MetS among 50–69-year olds with or at risk of MetS, living in a rural community in Western Australia. A randomized controlled trial was conducted among participants. Baseline and post-test data collection was done in both groups and the results indicated that the intervention group had a significant improvement in their metabolic MetS parameters. The researchers further indicated that adults aged 50-69 years and above and residing in a rural setting are at risk for MetS. The researchers therefore concluded that a home-based intervention can effectively improve the physical activity and dietary behaviors of adults aged 50–69 years who are either at risk or have MetS.

4.4.7.2.2 Sub-Theme 2: Physical Activity (Types of Physical Activity used for the Intervention)

Researchers in the studies used for this review used both conventional and unconventional exercises. These include:

- Aerobics (taking into consideration, activity levels of participants)
- Play interventions such as Dancing, boxing
- Gymnastics
- Wheel spinning
- Walking
- Pedometer assessment of steps per day
- Audio-taped activity instructions with music

Andersen, Høstmark, and Anderssen (2012) conducted a 5-month intervention study among a group of Pakistan immigrants residing in Norway. The purpose of the study was to explore whether there was a positive relationship between an increased physical activity (PA) and an improved metabolic status. Using simple randomized sampling, One- hundred and fifty (150) participants who were observed to be physically inactive were sampled into either a control group (CG) or an intervention group (IG). The intervention focused on increasing PA level, which was assessed using accelerometer recordings. Total Physical Activity level increased significantly more in the intervention group (IG) than in the control group (CG). The researchers therefore concluded that a five- month physical activity intervention program will result in an increased Physical Activity level among physically inactive individuals.

Similarly, Zeelie, Moss, Kruger, and Rooyen (2010)**,** conducted a study which sought to determine the effects of a 10-week physical activity (PA) in reducing the prevalence of MetS among black adolescents in South Africa. The researchers used a randomized control trial which consisted of an Experimental Group A and a control group consisting of 57 adolescents from 5 secondary (high) schools. The experimental group participated in a 10 week PA intervention. The study resulted in improvements in selective markers of the metabolic syndrome. The implications of the results are that adolescents should be

encouraged to increase their PA levels, which may result in significant improvements in selective markers of the MS.

4.4.7.2.3 Sub-Theme 3: Diet (Types of Diets used for the Intervention)

- High fiber diet
- High protein diet
- Fiber and vegetables
- Calorie restricted diet
- Low fat diet
- Low-fat, plant-based
- Hypocaloric-high protein diet

Kent et al., (2016)**,** did a study in the United States which sought to find out the effect of a 30-day lifestyle intervention on metabolic syndrome parameters of their study participants using a one group pre and posttest design. The researchers found out that; HDL levels decreased by 8.7% despite significant reductions in BMI and the other MetS indicator. MetS incidence generally reduced as well.

The researchers in their concluding remarks stated that a low-fat and plant-based diet improves MetS indicators with the exception of HDL. Similarly, Meckling and Sherfey (2007) carried out a randomized control trial of a hypocaloric high-protein diet, with and without exercise, and indicators of the Metabolic Syndrome in overweight and obese women in Ontario Canada. The groups were designated as control diet (CON), control diet with exercise (CONEx), high protein (HP), or high-protein with exercise (HPEx). Participants either exercised 3 times in a week or maintained their normal level of activity for 12 weeks. The results indicated that all groups lost weight over the 12week period, and all participants showed improved body composition, decreased blood pressure and decreased waist and hip circumference. However, triglycerides HDL, FBS and insulin levels were not affected by the diet and exercise. Participants also improved in cardiovascular fitness.

4.4.7.3 Theme 2. Duration of Intervention

Information gathered from the studies used for this review, revealed that period of the metabolic syndrome intervention used by the researchers ranged from four weeks (one month) to five years. From the articles gathered from this review, three(3) of the interventions lasted for less than three months, ten of the interventions lasted for three months, one was done for five months, six of them were done for a period of six months, while seven were done for more than six months (between nine months and five years). Thus, majority (10) of the interventions done in the researches used for this review lasted for a period of three months (12 weeks).

4.4.7.3.1 Sub-Theme: Number of Weeks or Months

Table 4. 39: Duration of Intervention

Duration of Intervention	Number of studies
One month(30 days)	1
Two months	1
Ten weeks	1
Three months (12 weeks)	10
Five months	1
Six months	6
Nine months	1
One year	2
One year, six months	1
Two years	2
Five years	1

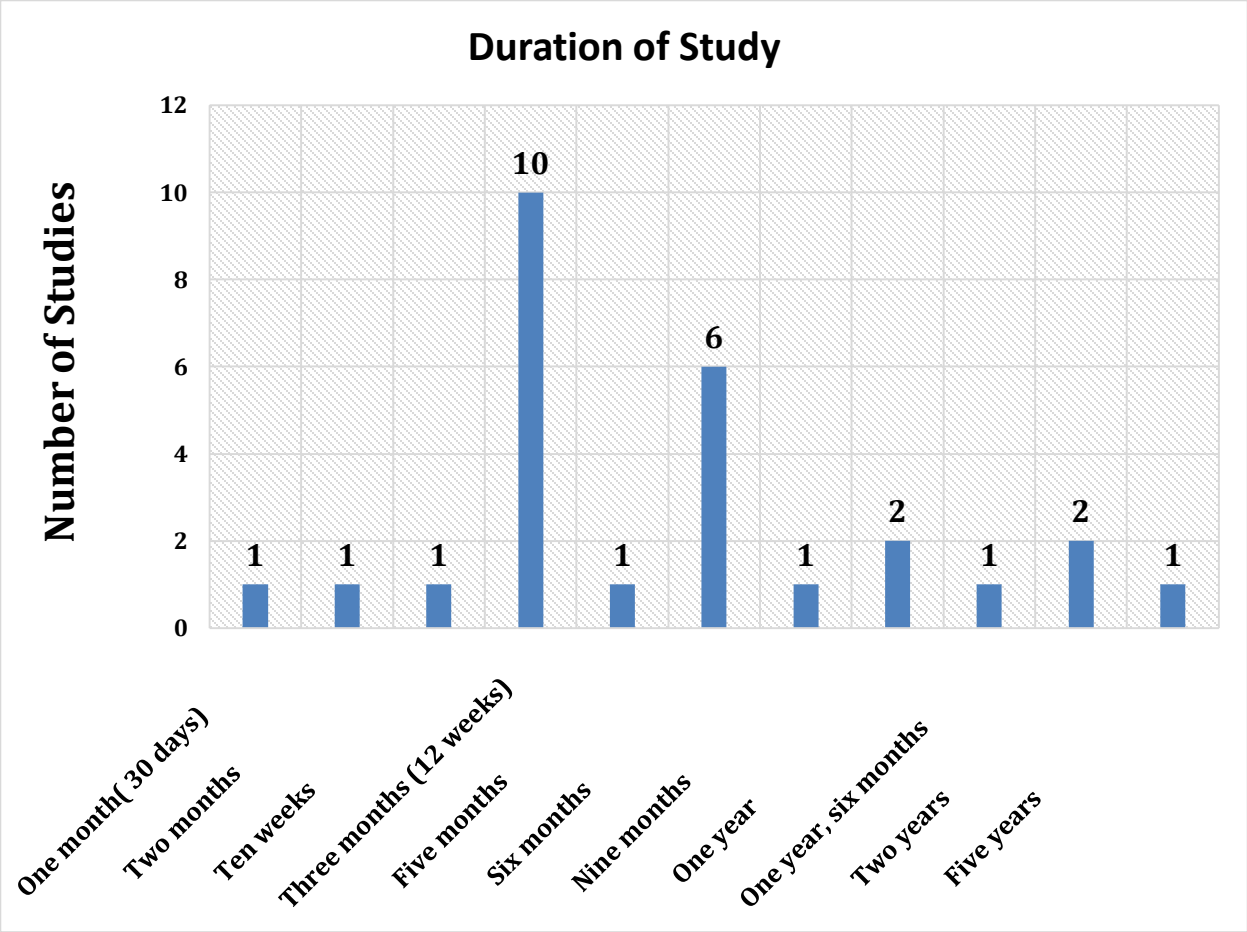

Figure 4. 22: Duration of Intervention

Baetge et al (2017) conducted a 12-week randomized control trial (nutrition, & commercial weight loss programs and exercise on metabolic syndrome) in 133 overweight and obese women aged 18 and 69 years. The primary aim of this study was to examine the effects of 4 commercial weight loss programs on MetS, weight loss, and several indices associated with health.

The four interventions included Curves Complete 90-day Challenge (CC, n = 29), Weight Watchers Points Plus (WW, n = 29), Jenny Craig at Home (JC, n = 27), Nutrisystem Advance Select (NS, n = 28) OR control (n = 20) as advocated from 2011–2012. A wait-listed control group (n = 20) was instructed not to change their dietary intake or engage in PA for the12 weeks of the study but were randomized into one of the four diet groups once they completed their initial control group. The study revealed that, a 12week MetS

intervention which entails a combination of Aerobic exercise and resistance training significantly improved MetS indices.

In another study, Tran et al (2016) carried out a 6-month community-based cluster-randomized controlled trial targeting adults with MetS from 10 communes in Hanam province, Northern Vietnam through the Vietnam Physical Activity and Nutrition (VPAN) program.

The VPAN program consisted of a range of resources and strategies, including an information booklet, resistance band, face-to-face education sessions, and walking groups. A total of 417 participants were recruited into the program (intervention n = 214; controls n = 203). This process evaluation assessed the participation, fidelity, satisfaction, and reasons for completing and not-completing the VPAN. The VPAN program included a range of resources and strategies designed to promote participants to be physically active and to maintain a healthy diet. All healthy lifestyle information was taken from the WHO's Global Recommendations on Physical Activity for Health, (2010), and the Food Based Dietary Guidelines in Vietnam (Hop, Van, & Thanh, 2011). The study revealed that, combination of printed resources, walking groups, and interactive face-to-face education sessions for a six-month period, appeared to be a suitable approach in terms of improving physical activity and eating behaviors, and support health enhancing lifestyle behaviors in the Vietnamese adults.

Gerstel et al., (2013) also did a study on impact of lifestyle intervention on body weight and the metabolic syndrome in home-care providers (HCPs) for a period of 12 months. 173 overweight and obese eligible home care providers comprising an intervention group (n=129) and the control (n = 44) group were recruited for the study. Respondents in the intervention group followed an instructive programme that invigorated physical activity and healthy nutrition, and were equipped with bicycles free of charge. Anthropometric, biological and lifestyle parameters were assessed at baseline, and after 6 and 12 months.

Body weight, waist circumference and systolic blood pressure significantly decreased at 12 months in both study groups. Incidence of the metabolic syndrome in the intervention group at 12 months was reduced by 50% (from 17 to 9.2%; P=0.04). There were also

decreases in LDL cholesterol (-0.36 mmol/L; P<0.01), total cholesterol/HDL cholesterol ratio (-0.57; P<0.01) and fasting glucose (-0.4 mmol/L; P<0.05), and an increase in HDL cholesterol (+0.22 mmol/L; P<0.01) in the intervention group. At 12 months, a decrease in daily caloric intake (-391 kcal/day; P<0.001) and an increase in the percentage of participants engaging in physical activity (+3.4%; P<0.05) were also observed in the intervention group.

4.4.7.4 Theme 3: Effect/Results of the Interventions

Sub-themes

- **Reduction in metabolic syndrome parameters/cardiovascular risk factors**
- **Reduction of metabolic syndrome complications**

The results showed that physical activity, nutrition and weight management significantly reduce metabolic syndrome parameters and cardiovascular risk factors, as well as reduction in complications of metabolic syndrome. Thus, there was much improvement in cardio metabolic profile for all the studies used in this review.

All the researchers in the studies used for the integrative review reported an improvement in anthropometric measurements, weight loss and reduction in BMI. HDL also showed significant improvement, while triglycerides level also reduced in some of the studies. There was also a meaningful reduction in lipid profile. The various interventions used by the researchers also resulted in improvement in blood pressure, especially the systolic blood pressure. Waist circumference for most of the studies also reduced at the end of the intervention.

The interventions adopted by the researchers in the studies used for this review therefore resulted in a reduction of metabolic and cardiovascular risk factors. The researchers also found out from the studies that majority of people with metabolic syndrome represent a low or sedentary activity type of individuals.

Saboya et al (2017) conducted a randomized controlled trial among 72 Brazilian adults aged 30-59 years. Individuals were randomized into three groups of multidisciplinary intervention; [Standard Intervention (SI) - control group; Group Intervention (GI); and

Individual Intervention (II)] for a period of 12weeks (3 months) to 9months. Lifestyle Intervention on Metabolic Syndrome and its Impact on Quality of Life was assessed. This comprised Group and individual interventions.

The volunteers in SI group had two consultations: at baseline and 3 months in which they were given non-pharmacological guidelines to MetS management by Staff nurses. The first consult focused on standard guidance on exercising, diet and self-care whiles the second one was on- either the facility or difficulty to follow recommendations for changing eating habits and regular exercising. The GI group received what SI group had but this time appointment occurred weekly during 1 hour and 45 minutes, coordinated by a psychologist, a nurse, a physical therapist and a nutritionist who gave Health Education on MetS risk factors and lifestyle changes. The II group participated in weekly individual appointments with the psychologist and nutrition teams and exercised regularly with the physical therapy team.

There was a significant reduction in body mass index, waist circumference, Systolic blood pressure at 3 months and the improvement of QOL, although it was significantly associated with the physical functioning domain. However, these changes did not remain 6 months after the end of intervention. Depression and anxiety were significantly associated with worse QOL, although they showed no effect on the response to intervention. (The primary outcome was change in the metabolic parameters, and secondarily, the improvement in QOL measures at three moments: baseline, 3 and 9 months).

The study showed that lifestyle intervention created important outcomes on metabolic parameters, especially on weight loss and WC, and the mean of WC reduction in the second group was similar to the one found in persons who underwent an intensive lifestyle intervention program. Also, the study demonstrated progress in QOL in both groups after intervention. The study also revealed that depression anxiety had an influence on individuals with MetS.

4.4.8 DISCUSSION

This study is the first assessment of intervention for metabolic syndrome in Ghana to date. Literature search provided evidence that 27 papers focusing on provided evidence on intervention programme for metabolic syndrome were published over a period of 10 years. From the review, it is evident that even though a lot of studies have been done on intervention or health promotion programmes for metabolic syndrome worldwide, only one study was found in Africa (South Africa) between year 2007 and 2017. There was no documented evidence of intervention programmes for metabolic syndrome in East, central and West Africa, especially Ghana. None of the studies in this review was also done in a market setting.

The review revealed that the mean age for participants involved in the intervention studies used for this review was 46.5. Twenty-six (96.2%) of the studies were done among adults and only one was done among adolescents. This finding might probably stem from the fact that metabolic syndrome increases with age. This supports Okafor (2012)'s study which revealed that metabolic syndrome is increasing in Africa and it tends to increase with age. It is evident from the review that six of the studies were done among only women, while only one was done among men. The remaining studies involved both male and female adults, hence women were found to out-number the men used in these intervention studies. Thus, the researchers were seen to be more interested in metabolic syndrome among women. This tallies well with Mandob, Samuel and Viviane (2015), who asserted that there is an estimate of 7 to 56 % prevalence of metabolic syndrome in women globally.

- **Level of Evidence of the studies reviewed**

Majority of the studies had a strong level of evidence. 74.1% (20) of the studies were randomized control trials and were at level 1c. The remaining studies used for the review 25.9% (7) were one group pre and posttest studies and were at level 2d. Rich (2005) stated that, levels of evidence are important in any research being undertaken as it indicates whether the research is reliable and trustworthy and can be used in practice. Using level 1 evidence provides patients with the treatment that has the greatest chance at being effective. In JBI level of evidence readers are encouraged to first search for those interventions that have shown to have a statistically significant treatment effect with well controlled research

studies. If there are no systematic reviews, or meta-analyses, then one may look for guidance from lower level methodologies (Joanna Briggs Institute, 2011).

- **Type and Duration of Interventions**

  The researchers in this review, used either exercise or diet therapy or both as the intervention or health promotion programmes for persons with metabolic syndrome, and these interventions were found to be very effective in reducing cardiovascular risks and metabolic syndrome indicators. Example Tran et al (2017) used a combination of printed resources, walking groups, and interactive face-to-face education sessions for a six-month period and this appeared to be a suitable approach in terms of improving physical activity and eating behaviors, and support health enhancing lifestyle behaviors in the Vietnamese adults. Gerstel, et al (2013) also employed the use of lifestyle intervention, and examined its effect on body weight and the metabolic syndrome in home-care providers (HCPs) for a period of 12 months. Kent et al (2014), conducted a study in the United States with the purpose of finding out the effect of a low-fat, plant-based lifestyle intervention (CHIP) on serum HDL levels and the implications for metabolic syndrome status. All these studies yielded positive results and reduced metabolic syndrome parameters.

  This result is consistent with Lo, Chair and Lee (2015), who found out in their study that MetS can be prevented through lifestyle changes facilitated through activities aimed at helping individuals to change their perceptions of their own health which will result in improved health outcomes. Arthur et al (2013) also revealed that; Lifestyle modifications such as an increase in physical activity and consumption of low caloric diets coupled with reduced intake of alcoholic beverages have been shown to alter the prevalence and gravity of the syndrome as well as to downgrade insulin resistance in women. It was also observed from this review that even though some of the interventions were theory based, the researchers instituted strict supervisory measures as a way of monitoring and ensuring that participants adhere to the interventions. This might be a contributory factor to the success and positive outcomes of the intervention programmes.

  Majority of the interventions were tested for a period of three or six months (10 and 6 studies respectively). This yielded a positive outcome (improvement in MetS indicators)

and resulted in retention and commitment on the part of participants. This signifies that the period of a MetS intervention might play a key role in obtaining a positive result. This agrees with Blackford et al (2016) who stated that; ‘’the findings demonstrate that 6-months programme engagement in physical activity, nutrition, and weight management significantly improved several metabolic syndromes parameters and cardiovascular risk factors for the participants’’. This notwithstanding, some of the intervention’s studies used for this review, were tested for as early as four and ten weeks and some also extended to two years and above. Irrespective of the duration, all the researches yielded a positive result. This might be attributed to commitment of participants and strict supervision by the researchers of the various studies.

The researchers for the studies in this review, used culturally appropriate diets, and physical activities were structured according to participants’ activity levels, and as the participants could tolerate. These might also be the enhancing factors for adherence and success of these intervention programmes.

- **Effects of the interventions**

  Results from the researches showed that physical activity, nutrition and weight management significantly reduce metabolic syndrome parameters and cardiovascular risk factors, as well as reduction in complications of metabolic syndrome. Thus, there was much improvement in cardio metabolic profile for all the studies used in this review.

  The researchers reported an improvement in anthropometric measurements, weight loss and reduction in BMI. HDL also showed significant improvement, while triglycerides level also reduced in some of the studies. There was a significant reduction in lipid profile. The various interventions also resulted in improvement in blood pressure, especially the systolic blood pressure. Waist circumference for most of the studies also reduced at the end of the intervention.

  This is consistent with Arthur et al (2013) who also revealed that; Lifestyle modifications such as an increase in physical activity and consumption of low caloric diets coupled with reduced intake of alcoholic beverages have been shown to alter the prevalence and gravity of the syndrome as well as to downgrade insulin resistance in women.

- **Nursing Implications and Recommendations**

  Metabolic syndrome must be included in the care and management of non-communicable diseases. Intervention programmes for metabolic syndrome must be done under strict supervision. Dietary patterns as well as individuals' activity levels must be taken into consideration in drawing diet and physical activity programmes for people with MetS. Health education programmes for the general public on metabolic syndrome should be instituted to create awareness of the syndrome and help reduce its incidence, especially in the African continent.

  Metabolic syndrome must be a priority area just like other non-communicable diseases in developing health care policies. There is the need for more researches on intervention or health promotion programmes for metabolic syndrome in Africa, especially West Africa and Ghana to be specific. Intervention studies on metabolic syndrome should also include qualitative researches.

4.4.9 CONCLUSION

In this section, the e health outcomes of people with metabolic syndrome is described. The research design and methods employed in conducting the literature review were also described**.** A lot of studies have been done on intervention programmes for metabolic syndrome, however, there is no documentary evidence or paucity of research on intervention for metabolic syndrome in Ghana and West Africa as a whole. None of the studies reviewed also captured market women.

Literature research used in this integrative review revealed that, MetS can be prevented through lifestyle changes facilitated through physical activities and diet modification and this can result in improved health outcomes. In conclusion, there is the need for more studies on intervention or health promotion programmes for metabolic syndrome in Africa, especially West Africa.

4.5 SUMMARY

This chapter described the results of knowledge and prevalence of Mets among market women and the relationship among demographics, knowledge of MetS and MetS predictors The results of quality of life of participants and the relationship among QOL domains and MetS predictors. The results of a focus group discussion describing the women's informed views about practices and measures contributing to improved health outcomes as well as an integrative literature review conducted to explore the documented MetS intervention programmes for promoting health in metabolic syndrome are also presented.

CHAPTER FIVE

PHASE TWO: DEVELOPMENT AND EXPERT REVIEW OF THE METABOLIC SYNDROME INTERVENTION

5.1 INTRODUCTION

In Phase 1, three quantitative surveys which comprised knowledge and prevalence of MetS as well as a qualitative focus group discussion and an integrative literature review were conducted with the purpose of generating data that will be triangulated to develop a MetS intervention programme for market women in Ghana.

Phase 2 consists of two parts. The first part is the development of the Mets intervention programme whereas the second part is the expert review process. The methodology for development and expert review of the MetS intervention programme is described in this chapter.

5.2 DEVELOPMENT OF THE METS INTERVENTION PROGRAMME

Onwuegbuzie & Teddlie (2003)'s seven-staged mixed method data analysis was adopted for the purpose of developing the Mets intervention programme (refer Table 5.1). The first column indicates the seven-stages whilst the second column is the description of the different stages and the last column is an indication of how seven stages of mixed method analysis were applied in formulating the MetS intervention programme. Figure 5.1 is a schematic illustration of how mixing of data was implemented in formulating the Mets intervention programme.

Table 5. 1 : Seven-Staged Mixed Methods Analysis Process

Description of the Seven-staged Mixed Methods Analysis Process		**Application in this study**
Stage One: **Data Reduction**	Involves analysis of data using exploratory thematic content analysis for qualitative data, and techniques such as descriptive statistics for the quantitative data.	Descriptive statistics were used for reporting the results of the surveys on the knowledge, prevalence and quality of life of market women with Mets as well as the integrative literature review. The qualitative focus group discussion was analyzed using thematic content analysis.
Stage Two: **Data Display**	Involves describing and displaying quantitative and qualitative data using e.g. tables, graphs, and Venn diagrams	Tables and figures in the form of bar chart, pie chart and histogram were used to display data sets of all the quantitative studies in chapter four and five and the integrative literature review in chapter six.
Stage Three: **Data Transformation:**	An optional stage whereby quantitative data is converted into narratives that can be analyzed qualitatively, and/or qualitative data are converted into numerical codes that can be presented statistically	In chapter five, thematic content analysis was applied to responses from the open-ended questions exploring the market women's opinions about their health and practices that contribute to good health. This was then followed by the quantification of similar results (quality of life of market women with MetS). The quantitative quality of life data and the qualitative focus group discussion were then merged through the use of narratives. Thus the numeric codes of results from the

		quality of life data was transformed after the analysis in order to compare it with the qualitative data
Stage Four: **Data Correlation**	Involves the correlation of data from the two paradigms of qualitative data being correlated with the quantitative data, or vice versa (the quantitative with the qualitative)	Data correlation was implemented firstly for the quantitative quality of life study, and the qualitative focus group discussion. The qualitative data categories were then discussed in relation to the quality of life domains. Similarly, the data from the knowledge and prevalence data sets were also correlated at the discussion phase to identify the knowledge of women who tested positive for metabolic syndrome on the condition.
Stage Five: **Data Consolidation**	Both the qualitative and quantitative data are combined to create new or consolidated variables or data sets	Data sets for all the quantitative surveys and the qualitative data, and the emerging results were discussed in relation to prior related behaviour, behaviour specific cognition and affect, and behavioral outcome as described by Pender (1996) in her health promotion model. The results from the above processes and the integrative review of MetS interventions designed by other researchers, then informed the development of a MetS wellness program for women with and at risk of MetS taking into consideration, the Ghanaian context.
Stage Six: **Data Comparison**	Involves comparing data from the qualitative and quantitative data sources	
Stage Seven: **Data Integration**	Both quantitative and qualitative data are integrated into either a coherent whole or two separate sets.	

Source: Adapted from Onwuegbuzie & Teddlie (2003)

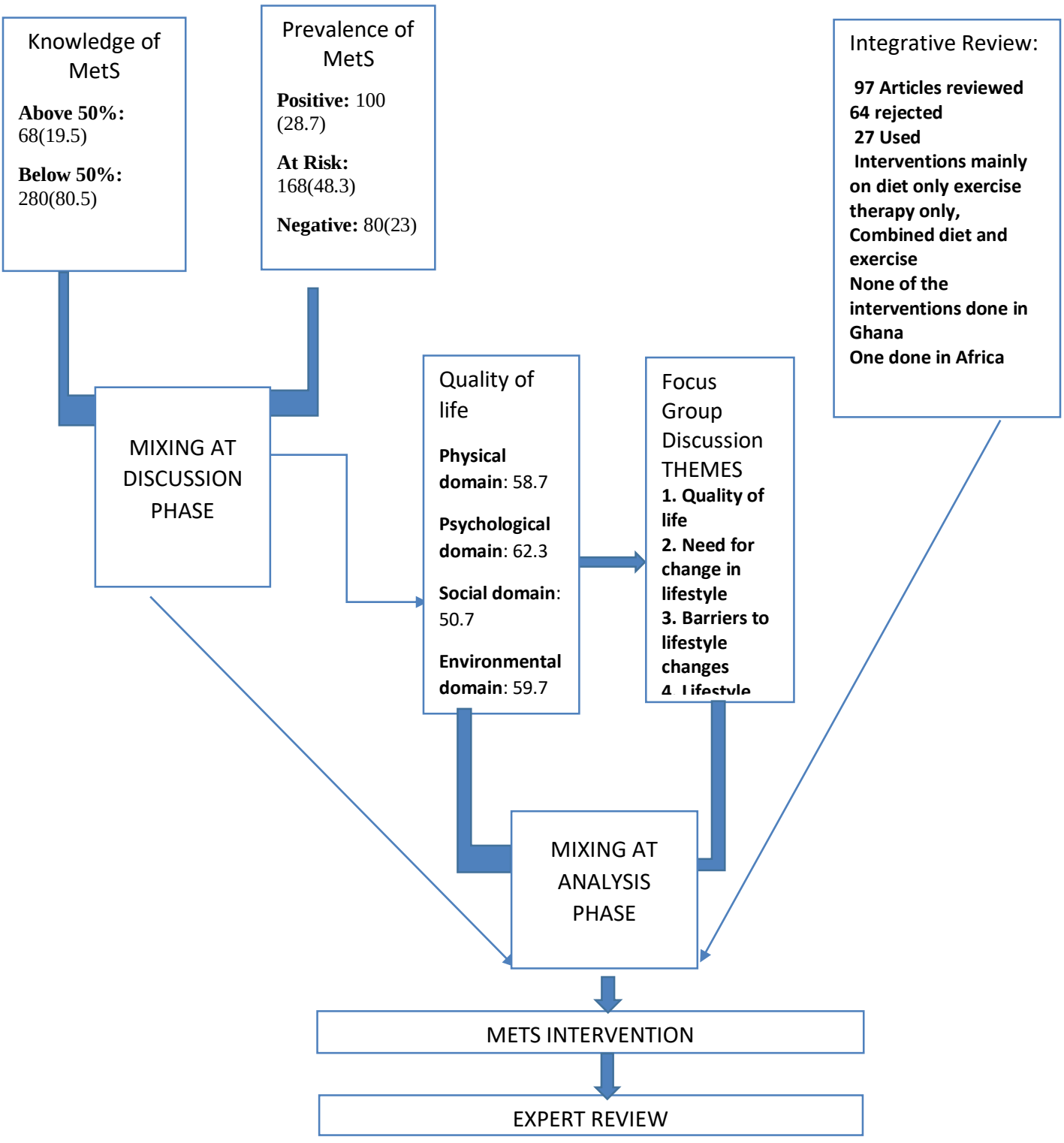

Figure 5. 1 : The Mixed Methods Analysis Process

5.2.1 The Mets Intervention Content

The content domain for the intervention programme was determined using the following:

- The results from the focus group discussion, in which the market women expressed their opinions about behaviors that may help improve health outcomes
- The researchers' observation of the lifestyle of the market women
- Information gathered from the integrative literature review.
- Common foods, fruits and vegetables available in Ghana were also taken into consideration
- A plan for the MetS intervention was written out, taking into consideration the age group and health status of the participants. Additional information which will help the market women to understand the intervention programme were also outlined in the plan.

A draft MetS intervention programme made up of nutrition or eating plan and a physical activity or exercise programme was then designed by the researcher and her supervisor. This was done in consultation with a dietician from the Department of Dietetics, University of Ghana Hospital, and a physical therapist from the University of Ghana**.** The eating plan captured common foods, fruits and vegetables available in the Ghanaian market as well as the eating habits of the market women. The physical activity programme also entailed exercises, which could be done by the market women both at home and in the market

The intervention was designed in the English language, but the content was interpreted and explained to the respondents in the local Ghanaian dialect (Twi) on commencement of the intervention. The draft wellness programme was made in the form of a booklet and comprised of a cover page (**Figure 5.2**). The cover page contained a picture of the Kaneshie market complex, the title of the booklet, and a column for writing the research code of participants. The MetS booklet content is illustrated in (**Table 5.2**).

COVER PAGE

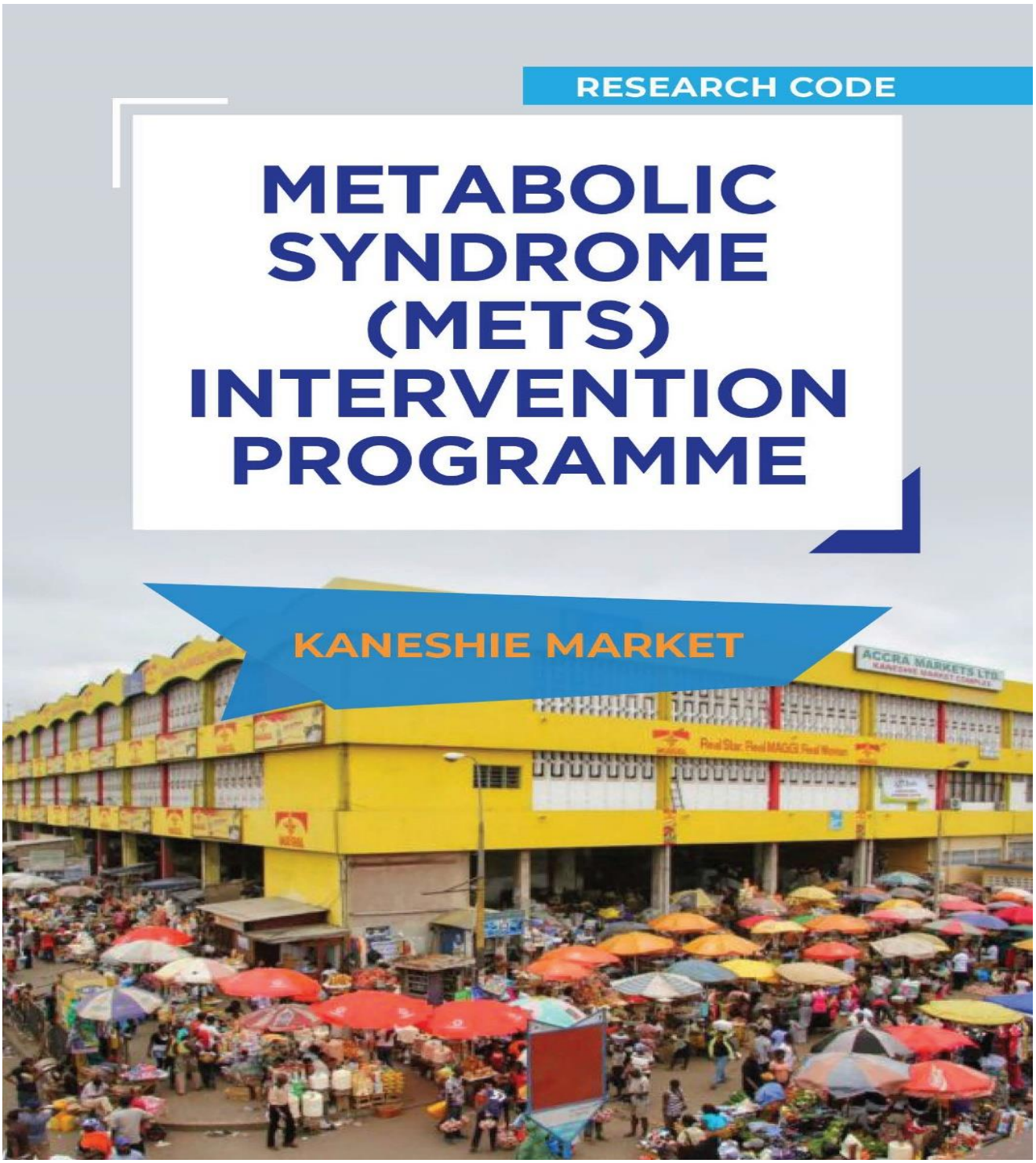

Figure 5. 2: The Kaneshie Market Complex

Table 5. 2Table of Content of the Intervention Programme

Page	Content
Page 2	Page two described the main purpose of the study, thus; what the study or intervention is all about.
Page 3	This page contained an introduction section which captured the following the reason for taking part in the pilot study, definition and MetS parameters or manifestations and expectations from clients
Page 4 and 5	These pages outlined a suggested eating plan which entailed a menu for breakfast, lunch, snacks and supper.
Pages 6-9	Pages six to nine outlined the suggested exercise programmes comprising unconventional (Use of water gallons, walking etc.) and conventional exercises (such as aerobics).
Page 10 and 11	Page ten and eleven comprised columns for recording weekly weights and other metabolic syndrome indicators of clients
Page 12	Consists of a reward section at the upper portion of the page. Participants who lost a significant amount of weight had stickers pasted in this section. The lower portion of this page had the contact details of the researcher and her supervisor

5.2.2: Expert Review of the Mets Intervention Programme

A draft copy of the MetS intervention booklet was submitted to the principal researcher's mentor in Ghana as well as the supervisor for review and inputs. Furthermore, the designed intervention booklet was subjected to a rigorous expert review process. The expert review process is a scientific standard appraisal process described as face validity to ensure that the developed programme or instrument measure what is supposed to be measured and give the desirable outcome (Polit and Beck, 2018).

Zamanzadeh et al (2015) recommended that a panel of experts must comprise at least five people in order to have sufficient control over chance agreement. However, stated that it is unlikely to have more than 10 people. To ensure face and content validity of the intervention in this study, a team of eight experts was constituted to review the intervention guided by Fleiss (1971). A team of experts were invited through a written letter and a participants' information sheet (Refer Appendix 8.II). Participants signed a consent form based on their approval prior to the study (Appendix 8.III). The panel of experts in this study comprised the following:

- An academician from the University of Ghana
- Two representatives of non-governmental organizations involved in health promotion programmes (life after 40 NGO and Ghana Society of Pediatric endocrinology and diabetes-GSPED).
- A dietician
- A physical therapist,
- A medical practitioner
- A registered experienced nurse from the Kaneshie clinic and
- A representative of the women participating in the study

The task of the reviewers was to rate the scale or programme items for relevance and comment on the need for additional items (Polit and Beck, 2018). The criteria used for the MetS intervention programme review process included:

1. Appropriateness of the programme for the community or population under study
2. Uniqueness to the community
3. Relevance of the programme to the community
4. Feasibility of the programme
5. Specificity of the programme to the population
6. Cultural sensitivity of the programme
7. Substantial contribution or solution to the problem

Quantitatively, the experts were requested to score each item from 1 to 4 with a four 4-point Likert Scale, where 1 connotes not relevant; 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant and also include their qualitative comments and recommendations.

- **Analysis of the Experts View Points**

  To assess the experts' rating for content validity**,** the viewpoints of the panel of experts on the relevancy, representativeness, clarity or ambiguity, suitability and comprehensiveness of the intervention were analyzed. The quantitative rating of the intervention by the experts, their universal agreement, and recommendations on observing grammar, using appropriate and correct words and proper order of content, of the intervention were then adopted (Zamanzadeh et al (2015). In assessing for the experts' rating regarding face validity of the designed MetS intervention, the team of expert's comments related to the appearance and apparent attractiveness of the programme, which may affect the acceptability by market women were also analyzed.

- **Suggestions by Team of Experts**

  The suggestions and inputs given by the team of experts as regard the wellness programme informed the restructuring of the wellness programme to suit the market women, and the Ghanaian context as a whole. After the expert review, the field notes written down were discussed with the supervisor to ensure that all the comments of the expert panel had been captured. Analysis of the field notes, revealed that the main concerns of the expert panel revolved around some phrases and terminology used, the eating plan and exercises.

- **Eating Plan:**

  The draft programme originally included snack after supper but it was removed as suggested by the expert panel. Some vegetables and fruits which were regarded as uncommon on the Ghanaian market were also removed and replaced with common ones. The meal times for breakfast, lunch and supper were also restructured. Some foods which were initially captured under the ''sometimes'' column on the eating plan, was moved to the ''never'' column.

- **Exercises:**

  Some of the exercises outlined in the draft, were restructured to suit the market women. Suggestions were given by the expert panel to use large mineral water bottles filled with sand in place of water gallons for upper body dominant exercises.

- **General Comments:**

  Overall, the draft programme was rated by the team of experts as very relevant and useful, however, the team was of the opinion that some of the phrases and terminologies would be difficult for the community to understand and hence should be replaced with simple words and phrases to suit the market women and the Ghanaian context. The wellness programme was therefore restructured, corrections were made as suggested by the panel of experts, and the services of a professional graphic designer was solicited to finally design the intervention programme into a booklet. The programme together with a progress report on phase one was then submitted to the Noguchi Memorial Institute for Medical research, to seek for ethical clearance before pilot testing it among the market women. The designed programme was pilot tested among 70 market women identified to have MetS.

5.3 SUMMARY

This chapter focused on the processes involved in designing the MetS intervention programme. The components of the programme as well as the expert review of programme by a team of experts are also described. In the next chapter pilot testing of the MetS intervention programme is described.

CHAPTER SIX

PILOT TESTING, OUTCOME EVALUATION AND PATIENT SATISFACTION SURVEY

6.1 INTRODUCTION

Chapter Six described the development and expert review of the MetS intervention programme. In this Chapter, the processes involved in achieving the objectives of pilot testing and evaluation of the intervention is described. Chapter 6 is divided into two sections. Included in Section A is the pilot study and the MetS awareness day, which was the pilot study as well. In the context of this study, the researcher's main purpose for conducting the pre-test was to measure the feasibility of the Mets intervention in enlightening health outcomes and quality of life of women with MetS. Thus, to determine whether the intervention programme would be effective in fulfilling its purpose. The immediate objectives of the designed MetS intervention were to improve knowledge and prevalence of MetS, as well as the quality of life of women with MetS. In this section, the procedures followed in pilot testing the MetS intervention programme among the market women are described.

In view of the fact that Phase 3 is post intervention, throughout, the results of the post intervention will be compared with the results of the pre-intervention phase (n=70) in order to draw a conclusion regarding the effectiveness of the MetS intervention programme.

In Section B: The researcher's evaluation of the success or failure of the entire research process as well as a participants' satisfaction survey conducted to assess the opinions of the market women about the MetS intervention programme are also described. The methodology for evaluating the MetS intervention programme and the entire research process are also outlined.

6.2. INTERVENTION DESIGN AND STRATEGIES

The designed MetS intervention was pilot tested among a group of market women identified to have metabolic syndrome (n=70). This study employed the one group pre and post-test design. The same group of market women identified to have MetS, were subject to a MetS intervention for a period of three months, after which their knowledge and prevalence of MetS as well as quality of life were reassessed (Knapp, 2016).

Existing studies suggests that, a pilot study sample, should be 10% of the sample projected for the lager parent study (Connelly, 2008). Whitehead et al (2016), however stated that, when estimating the sample size for a pilot trial, the simplest method to apply are sample size rules of thumb. Brown (1995) cites a general flat rule to 'use at least 30 subjects or greater to estimate a parameter' whereas Teare et al (2014) recommend a pilot sample size of 70 in order to reduce the imprecision around the estimate of standard deviation.

Sample Size

In this study, seventy-three (n=73) participants initially agreed to participate in the pilot study. This comprised seventy (n=70) out of the hundred (n=100) market women identified to have tested positive for MetS and three women (n=3) out of one hundred and sixty-eight (n=168) women who belonged to the at-risk group. However, three participants who belonged to the at-risk group, later rescinded their decision and dropped out from the study. The convenience sampling method was used in recruiting subjects for this pilot study. On completion of the knowledge and prevalence of MetS surveys, participants were given a feedback on their Mets status through group meetings. A written report of the results of the Mets prevalence screening was issued to all participants of the study.

Recruitment of participants for the pilot study

In a meeting the women were grouped as follows: Positive, at-risk and negative for Mets. The negative group were given health talk as well as flyers on causes and prevention of MetS before being released from the programme. Talks were then held with the-at –risk and positive for MetS groups and the implications of their results were explained to them. Referrals were also made to the Kaneshie market clinic for participants who were identified

to have high blood pressure and blood glucose levels as well as those who have defaulted on going for follow up care.

Participants who fell in the positive for Mets and at-risk groups were again asked to join the subsequent stages of the research which included the pilot study. The purpose of the pilot study as well as the role of the participants were spelt out to them. Those who agreed to participate were requested to sign consent forms (Appendix 8). Permission was again sought from the market administration as well as the market queen and her team and approval given before the beginning of the pilot study.

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Table 6. 1: Plan for Implementation of the MetS Intervention Programme

Developmental Objective	Immediate Objective	Target	Activities	Where	With whom and what	How people were invited & feedback
- To improve health outcomes	1.Create Knowledge	Traders and Customers at the Kaneshie market	MetS awareness day Health talks/ Distribution of flyers Screening (blood pressure) Quizzes and presentation of gifts	Market queen space and floors of the market	Partners (other organizations) - Research Assistants -Volunteers Materials - B/P Apparatus - Health information booklet - Gifts -posters, PAS, bell, flyers -megaphone	-Phone calls -Partner meetings -Register (Records of number of attendants
		Women with MetS at the	MetS Intervention programme		- Research assistants - Market women with	-Feedback from support group

	2.Reduce prevalence of MetS 3. Quality of life	Kaneshie market	-Health talks (discuss diet and exercise) Diet (eating plan) Exercise therapy -Distribution of MetS intervention booklet to participants Weekly monitoring of body weight Post intervention data collection (anthropometric and physiologic measurements	Private space at the market administration	MetS - Support group - Dietician - Physical therapist -Glucometer -B/P apparatus - Stadiometre, Tape measure -blood cholesterol check in the laboratory - Records keeping booklet -MetS wellness program, Budget -Budget	-Feedback from research assistants -Phone calls -Follow up visits

6.3 Plan for Pilot Testing the Mets Intervention Programme

6.3.1 Project Management Plan

A project management plan designed was designed as indicated on Table 8.1 which consists of:

- The developmental and immediate objectives
- Programme of activities for the pilot study
- Recruitment/involvement of personnel (research assistants, and NGOs)
- Equipment and materials needed for the pilot study

6.3.2 Training of Research Assistants

A total of five research assistants were recruited during phase one of the study and trained to assist with the pilot study. This comprised graduate student from the University of Ghana who hold a first degree in nursing, had completed their national service, and were awaiting employment.

6.3.3 Preparation of Participants and the Registration Process

Before the initiation of the intervention programme, a group discussion was held with all the participants who had agreed to participate in the pilot study. The purpose was to explain the process which included the details of the pilot study; which included the purpose and relevance of the intervention programme, as well as roles, and expectations of both the researcher and participants. Participants were briefed that the programme will run for three months. Participants were informed that during this time, they will partake in aerobic sections, regular meetings, weekly weight checks and adherence to the eating plan which they willingly agreed on. IN addition, they were also informed that at three months their MetS status, knowledge and quality of life will be checked again to help evaluate the intervention and the programme as a whole.

A dietician and physical therapist were invited to hold individual, one-on-one and group discussions with the participants to reinforce the education given so far. In addition, the women were given information on effective ways of cooking or healthy cooking, the eating

plan designed, and the exercise programmes outlined in the intervention. This was done to ensure adherence and effectiveness of the programme. The research assistants were then introduced to the participants as health personnel who were going to assist with the pilot study.

Each respondent was given a research code. A register which comprises the contacts, stall numbers and research codes of all the participants was kept. Each participant was also given a copy of the designed intervention programme (Appendix 8).

6.3.4 Setting and Equipment

Permission was sought and granted by the market administration to use the space for health screening in the market for meetings and weekly weight checking of participants.

Equipment for the pilot study such as a stadiometre, blood pressure apparatus and glucometer register, and records keeping book were made read

6.4 PROGRAMME OF ACTIVITIES FOR THE PILOT STUDY

The programme was presented over a period of three months. In pursuit of effective and successful outcome of the pilot study, the following activities were carried out:

6.4.1 Formation of Support Groups

- Support groups were instituted among the participants according to stall numbers and floors. Participants were divided into ten groups of seven and eight, and each group had a group leader who spearheaded the aerobics, and the smooth running of the entire programme.

- Group meetings were also held on a weekly basis for further discussions on the programme. However, some group members were reported to be absenting themselves from these meetings but were regular during the weight checks.

- Regular meetings were held with the group leaders as well as participants for further discussions and feedback on the programme.

- Reminders and follow ups through telephone calls and text messages were also sent to the women to encourage and motivate them. This was done on a regular basis by the researcher and research assistants.

6.4.2 Exercises

Dancing and aerobic sessions were held among the various groups on a weekly basis lead by the group leaders. This was done at the open space at each floor of the market. Apart from exercising, participants entertained themselves with the dancing and at times competed for the best dancer. Each participant was given empty mineral bottles filled with sand which they used for upper body exercises at their leisure time.

6.4.3 Screening

Weekly monitoring of participants' body weights and body mass index (BMI) was done to ensure adherence and also monitor progress and success of the programme. The market women agreed that the weight checks be done on Fridays since the market is less busy on this day. The weights and BMI were then recorded in the wellness or intervention booklet, as well as a record keeping booklet kept by the researcher for this purpose.

- The blood pressure and blood glucose levels of those with high blood pressure and blood glucose were monitored on a fortnight basis.
- At six weeks, all the participants had their weights, BMI, waist circumference, blood pressure and blood glucose checked again
- At three months, the knowledge of MetS, MetS status (prevalence of MetS) and quality of life of the market women in the pilot study were re-assessed. Participants' anthropometric and physiologic measurements were checked again, and researcher assisted interviews were also conducted. The results were used to evaluate the primary and secondary outcomes of the MetS intervention.
- The final screening of participants and data collection for the knowledge of MetS and quality of life of the market women were concurrently done for two consecutive days, after the MetS awareness day. The women were separated into two sections and each section was scheduled for a day and time for the data collection process.

Field notes and report were written, capturing adherence to the programme, as well as the concerns and suggestions from the participants about the programme.

6.4.4 Mets Awareness Day

Purpose

A MetS awareness day was held at the Kaneshie Market before to the post intervention data collection, with the purpose of creating awareness among market women and the general public.

Target Population

The target population for the awareness day was all market women and customers who had come to buy from the market.

Team for the Mets Awareness Day

The team for embarking on this awareness day comprised; representatives from two non-governmental organizations (NGOs) namely; the life after 40 hypertension awareness NGO and Ghana Society of Pediatric endocrinology and diabetes (GSPED) research assistants and volunteers. The awareness day was organized in consultation with the market queen and with permission from the market administration.

The programme line up for the MetS awareness day

This included;

- Health talks and education of the market women and customers on MetS
- Random checking of blood pressure. Over 500 market women and customers had their blood pressure checked (Refer Table 8.2). Appropriate referrals were done, advice and education were given to women whose blood pressure were found to be above the normal range.
- Tracts (flyers) were also given out to the market women and customers who had come to shop at the market. These tracts had a summary of the definition, predisposing causes, complications and prevention of MetS. Education (of metabolic syndrome awareness health talks on diet, exercise and healthy living) on MetS was also given on each floor as well as the open space outside the market.
- Dance sessions and aerobics were also held at various sectors and floors of the market

- A meeting and talks were also held with the market queen and her executives as well as leaders of the various divisions and groups at the market who were nominated as ambassadors for creating awareness on MetS.
- Quizzes were done after the talks and gifts (souvenirs such as T-shirts and aprons which had the inscription; ‘‘know your metabolic syndrome status’’ were presented to individuals who answered questions correctly.

Results for Blood Pressure Checked on the Mets Awareness Day (N=502)

Table 6. 2: Descriptive statistics for Age and Blood Pressure

Variables	**Minimum**	**Mean**	**Median**	**Mode**	**Maximum**	**SD**
Age	**20**	**46**	**46**	**50**	**80**	**11.89**
BPs	100/60	130/85	130/80	120/80	220/140	19.83/12.82

The table above presents the descriptive analysis of the blood pressure screening conducted on the MetS awareness day. The population comprised some market women and customers at the Kaneshie market aged 20 to 80 who were selected through convenience sampling.

In all, a total of n=502 participants were screened, and the results revealed that the minimum age was 20, the maximum was 80 with a mean and standard deviation of 46 and 11.9 respectively. The minimum BP was 100/60, the maximum was 220/140, while the mean and standard deviation were 130/85 and 20/13 respectively. The results based on the IDF criteria for Mets, indicate that per the population of market women and customers, predominantly had high blood pressure.



Figure 6.1: The MetS team and programme of activities for the MetS awareness day

6.5 Evaluation of the Mets Intervention Outcomes

This phase of the study entails evaluation of the primary and secondary outcomes

Sample size and sampling, and Data collection procedure

The sample size for the post intervention studies comprised all (n=70) market women who participated in the pilot study. The women were invited again to participate in these studies and were made to sign consent form.

The date for the data collection was planned with the market women, and the market place health room was again used for the post intervention data collection.

The data collection for all the three quantitative surveys namely prevalence and knowledge of Mets as well as quality of life of the women were done concurrently within a period of two days. Participants were divided into two groups. Thirty –five people were assigned to each day and on each day, participants were first registered, at station one and then proceeded to stations two and three, where a researcher administered interview was conducted to elicit information from the women regarding their knowledge (Appendix 9.I) and Quality of Life (Appendix 9.II) This was followed by physiologic and anthropometric measurements of participants to re-assess the prevalence of MetS (Appendix 9.III).

Data were captured on a Microsoft Excel spreadsheet and imported into Statistical software package "STATA" version 13.0. Descriptive and inferential statistical tests were then used to summarize, organize and present the data. The paired T-test was used to compare the pre and post intervention data in order to assess the success of the MetS intervention programme.

6.5.1 Primary Outcome

Comparison of Pre and Post Intervention Results and Discussion

This session describes a presentation of the demographic features and comparison of the results for the pre and post intervention data on prevalence of MetS among participants

who enrolled in the pilot study using a Tukey Statistical test. Participants' demographic data are further presented diagrammatically as shown below:

6.5.1.1 Demographic Features of Participants in the Pilot Study (N=70), Frequency and Percentages

Table 6. 3: Demographic Features of Participants

	Description	**Frequency (n) percentages (%)**
Age	20-29	1(1.4)
	30-39	6(8.6)
	40-49	20(28.6)
	50-59	31(44.3)
	60-69	12(17.1)
Marital Status	Single	7(10)
	Married	42(60)
	Divorced	8(11.4)
	Widowed	13(18.6)
Educational level	Middle school	38(54.3)
	None	6(8.5)
	Primary	13(18.6)
	Secondary	11(15.7)
	Tertiary	2(2.9)
Socio-cultural	Akan	33(47.1)
	Ewe	4(5.7)
	Ga	27(38.6)
	Other	6(8.5)
Religion	Christian	68(97.1)
	Muslim	2(2.9)
Diabetes diagnosis	No	65(92.9)
	Yes	5(7.1)
Hypertension diagnosis	No	43(61.4)

	Yes		27(33.6)	
On medication	No		4(11.8)	
	Yes		30(88.2)	
Period trading	Minimum	Mean	Maximum	SD
	1	23	45	9.8

Table 6.3 above represents the distribution of the participants' demographic features which comprise age, marital status, educational level, socio-cultural and religious affiliation, diabetes and hypertension diagnosis and those on medication for the management of diabetes and hypertension.

Age Group of Participants

Table 6.3 above indicates that 12(17.1) participants were within the ages of 60-69, 31(44.3) were between 50-59 years, 20(28.6) were between 40-49, 6(8.6) fell within the 30-39year group, while only 1(1.4) was between 20-29 years. The 50-59year group were the majority and this supports the assertion made by other researchers that the incidence of MetS commonly occurs among post-menopausal women aged 50 and above. Similarly, Owolabi et al., (2017) also revealed that the prevalence of Metabolic Syndrome recorded a higher value among the respondents who were aged 56 years and above. Consistent with this result, Osman et al., (2015) also revealed in a study conducted in Northern state, Sudan that the total prevalence of metabolic syndrome among postmenopausal women was 51.4%.

Marital Status of Participants

The results of the marital status distribution of participants revealed that out of the 70, the majority of 42(60%) were married, 13(18.6%) reported that they were widowed, 8(11.4%) stated they were divorced, while 7(10%) reported that they were single. The high percentage of married participant indicate that far from being absolute, the women enjoyed the emotional support and bonding offered by spouses.

Educational Level of Participants

A significant majority of 38(54.3%) had received education up to the Middle School level, whilst 13(18.6%) had education up to Primary level, a minority of 2(2.9%) were found to be tertiary level literates, whilst 11(15.7%) participants also indicated that they had received Secondary level education. 6(8.5%) however, stated they did not receive any form of education. A total of 91.4% of participants had at least obtained some form of education up to primary level. This indicates that the population was moderately a literate populace. Owolabi et al., further revealed that the prevalence of MetS was associated with low grade education. However, contrary to his assertion, the findings of the current study found no association of the prevalence of Mets with educational level of participants.

Socio Cultural Background of Participant

As indicated in figure 6.7, close to half of a maximum number of respondents involved in the research were Akans 33(47.1%), followed by 27(38.6%) who were Gas, 4(5.7%) were Ewes, while 6(8.6%) belonged to other socio-cultural backgrounds. This result may be attributed to the fact that in Ghana, the Akan tribe constitute the great majority. Sociocultural background of an individual in Ghana, may influence the choice of food. For instance some tribes in Ghana eat a lot of carbohydrates.

Religious Affiliation of Participants

68(97.1%) participants were Christians while 2(2.9%) were Muslims. This result may stem from the fact that over 80% of Ghanaians are Christians. Religious affiliation of an individual in Ghana may affect their health. Some religious groups in Ghana have certain believes and practices which may affect their health seeking or promoting behaviors , making them prone to the development of MetS.

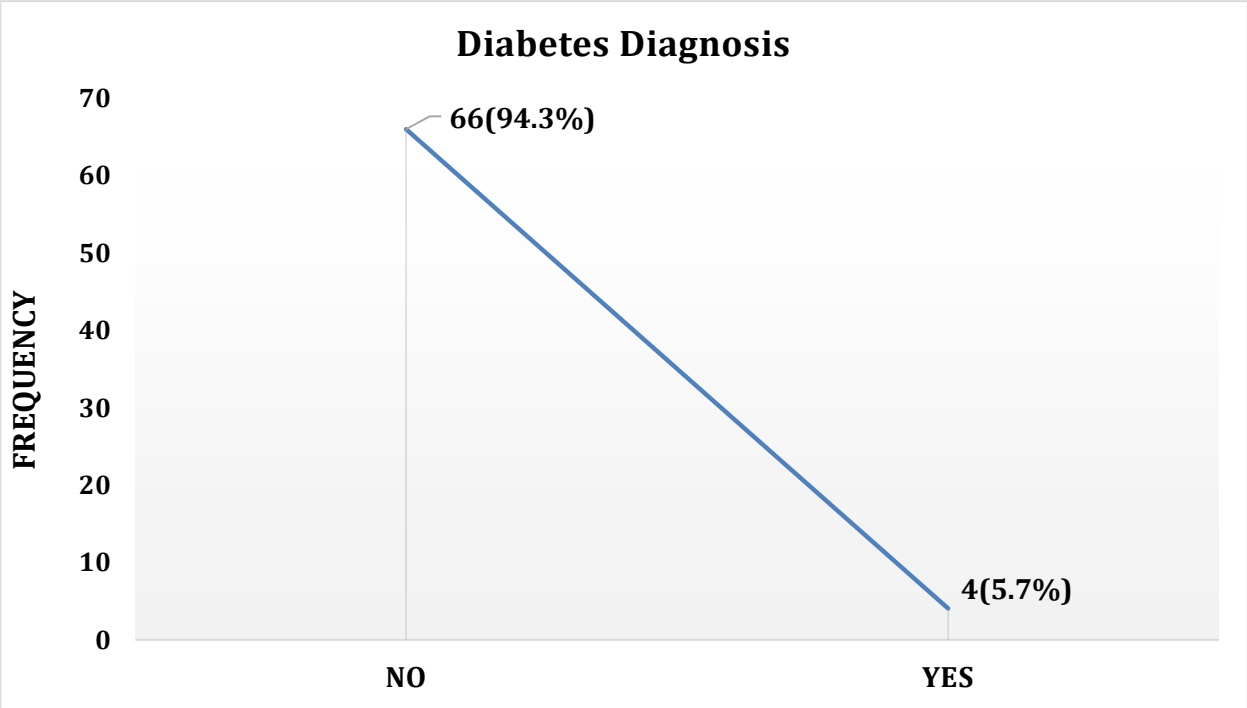

Figure 6. 1: Diabetes Diagnosis

Figure 6.9 is a slopping graph to indicate the number of people who were known diabetics against the number who had never been diagnosed of diabetes. From analysis, majority 66(94.3%) participants indicated they had never been diagnosed of diabetes, while 4(5.7%) stated they had ever been diagnosed of diabetes. This indicates that only a minority of the participants were known diabetics.

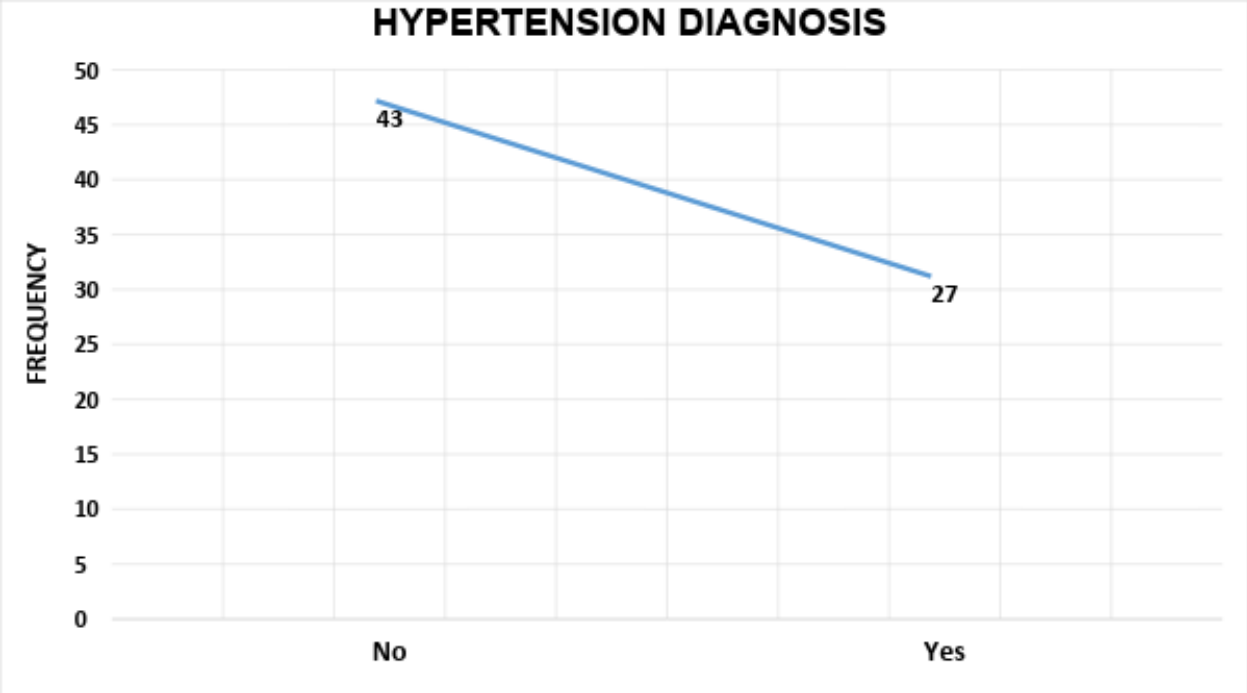

Figure 6. 2: Hypertension Diagnosis

Figure 6.10 is also a slanted graph to indicate the number of people who were known hypertensives against the number who had never been diagnosed with hypertension. From the analysis, majority 43(61.4%) of participants averred that they had not been diagnosed with hypertension. However, 27(38.6%) stated they had ever been diagnosed with hypertension.

This result indicates that, more than a third of the participants were known hypertensives hence were at risk of MetS.

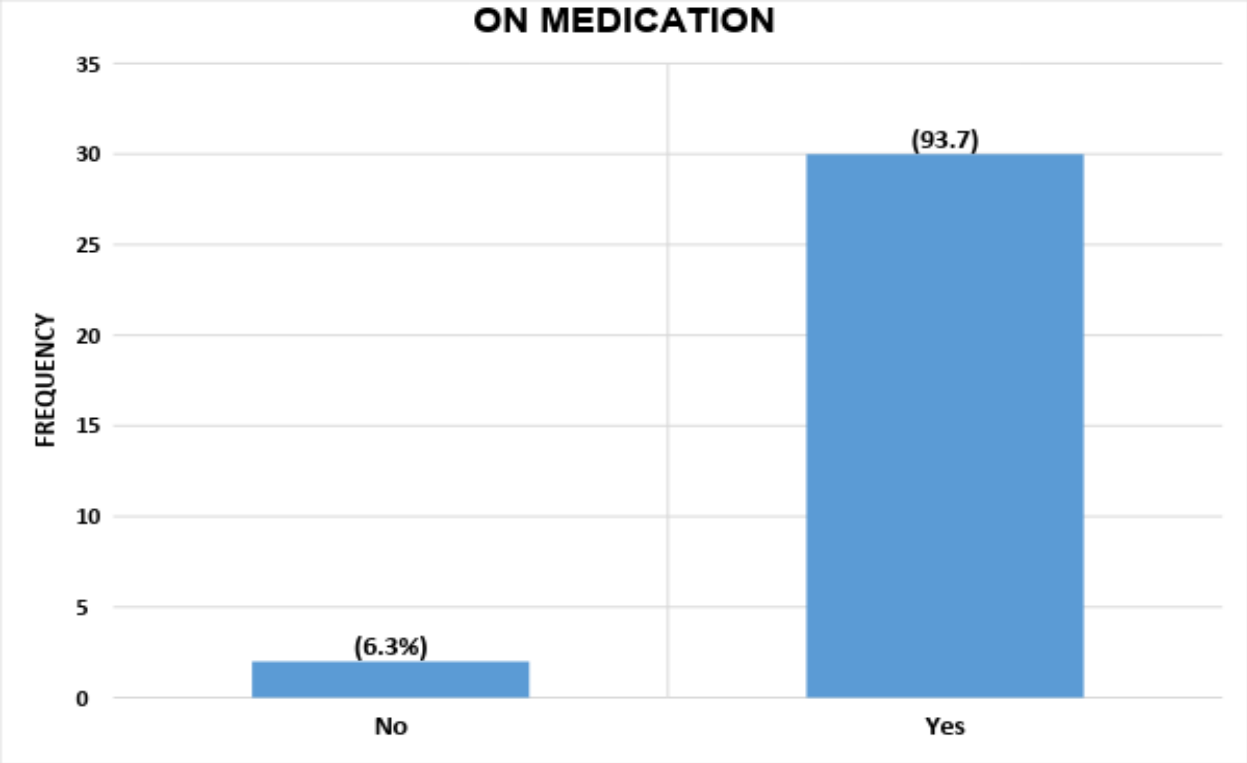

Figure 6. 3: Participants on Medication

From Figure 6.11, out of a total number of 32 participants who were diagnoses with either diabetes or hypertension, majority of 30(93.7%) participants were on one form of medical treatment while 2(6.3%) were not on any form of medication despite being diagnosed of diabetes or hypertension.

Participants who were known diabetics and hypertensives but stated they were not on any medications revealed that they stopped taking the medications after their initial diagnosis and treatment. Some of these participants gave various reasons for their non-adherence to these treatments which included: the side effects of the medications, some also resorted to traditional and herbal medications as well as spiritual treatment.

Table 6. 4: Pre and Post-Intervention Analysis of the Determinants of Mets
Prevalence of Mets (N=70)

	Pre-Intervention		**Post-Intervention**	
MetS Determinants	**Description**	**Frequency (n) & Percentages (%)**	**Description**	**Frequency (n) & Percentages (%)**
Waist Circumference	High	70(100)	High	58(82.9)
	Normal	0(0)	Normal	12(17.1)
HDL	Abnormal	52(74.3)	Abnormal	12(17.1)
	Normal	18(25.7)	Normal	58(80.9)
TRIG	High	6(8.6)	High	0(0)
	Normal	64(91.4)	Normal	70(100)
FBS	High	39(55.7)	High	24(34.3)
	Normal	31(44.3)	Normal	46(65.7)
BMI	Obese	54(77.1)	Obese	49(70%)
	Overweight	16(22.9)	Overweight	21(30%)
BP	High	53(75.7)	High	33(47.1)
	Low	1(1.4)	Normal	36(51.4
	Normal	16(22.9)	Low	1(1.4)

The table above is a presentation of a comparison between the pre and post intervention results for participant's MetS indicators.

Table 6. 5: Descriptive Analysis of Participants' Age and Determinants of Metabolic Syndrome

Age	**Minimum**	**Mean**	**Maximum**	**Standard deviation**
	28	51	65	8.3

Table 6. 6: Mets Determinants Pre and Post Intervention (N=70)

Pre-Intervention					**Post-Intervention**			
Variable	**Minimum**	**Mean**	**Maximum**	**Standard deviation**	**Minimum**	**Mean**	**Maximum**	**Standard deviation**
BMI	25.1	35.4	64.0	7.3	25.0	33.4	61.0	6.7
WC	36.0	41.3	52.0	4.1	34.0	39.0	50.0	3.9
FBS	3.5	6.5	16.3	2.8	3.9	5.6	9.9	1.2
HDL	0.68	1.2	2.6	0.3	0.9	1.6	2.7	0.4
TRIG	0.6	1.2	2.6	0.3	0.6	1.0	1.6	0.3
BP Systolic	100.0	143.3	210.0	20.4	100.0	130.4	170.0	13.8
BP Diastolic	60.0	87.7	120.0	11.1	60.0	81.7	110.0	11.2

- **Waist Circumference**

From the analysis, the mean waist circumference for participants before and after the intervention was 41.3 and 39.03, respectively with a mean difference of 2.27 indicating that the average waist circumference after the intervention reduced. The pre-intervention results showed that all 70(100%) participants involved in the piloting of the MetS intervention had high waist circumference. However, the number reduced to 58(82.9%) after the intervention. This is shown in the boxplot below:

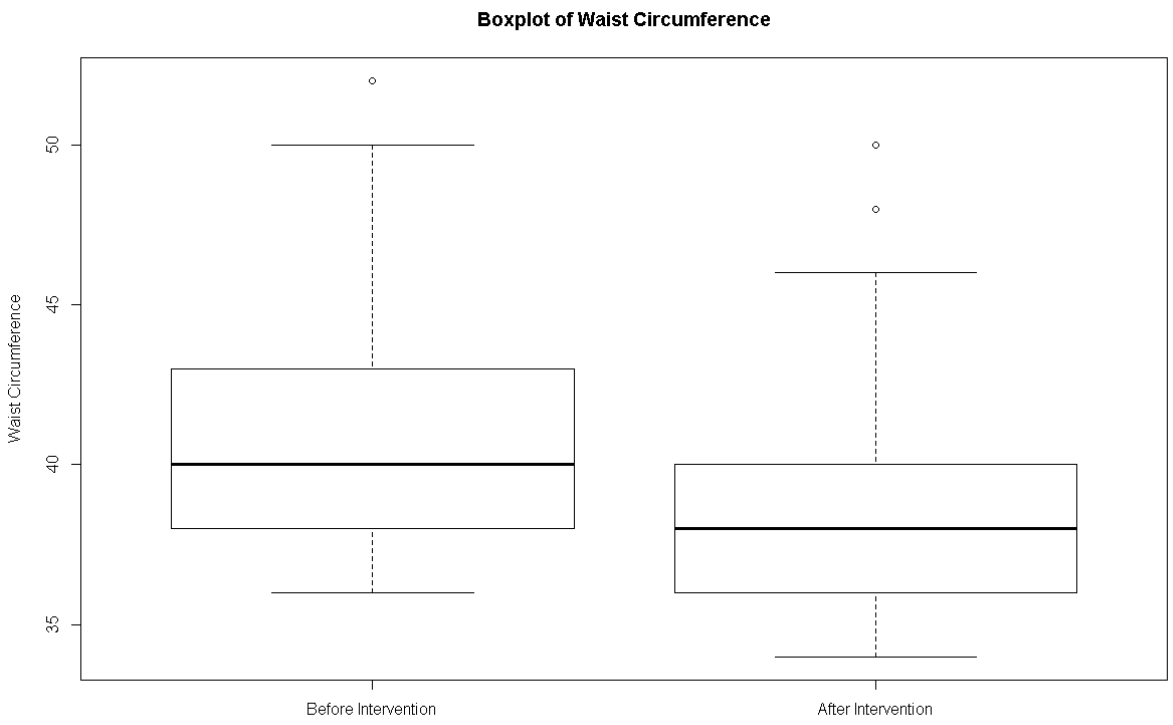

Figure 6. 4: Boxplot of Waist Circumference

As represented in Figure 6.12 above, the study showed that a significant change occurred in the waist circumference of participants after the intervention. The average waist circumference following the intervention is much smaller than before the intervention.

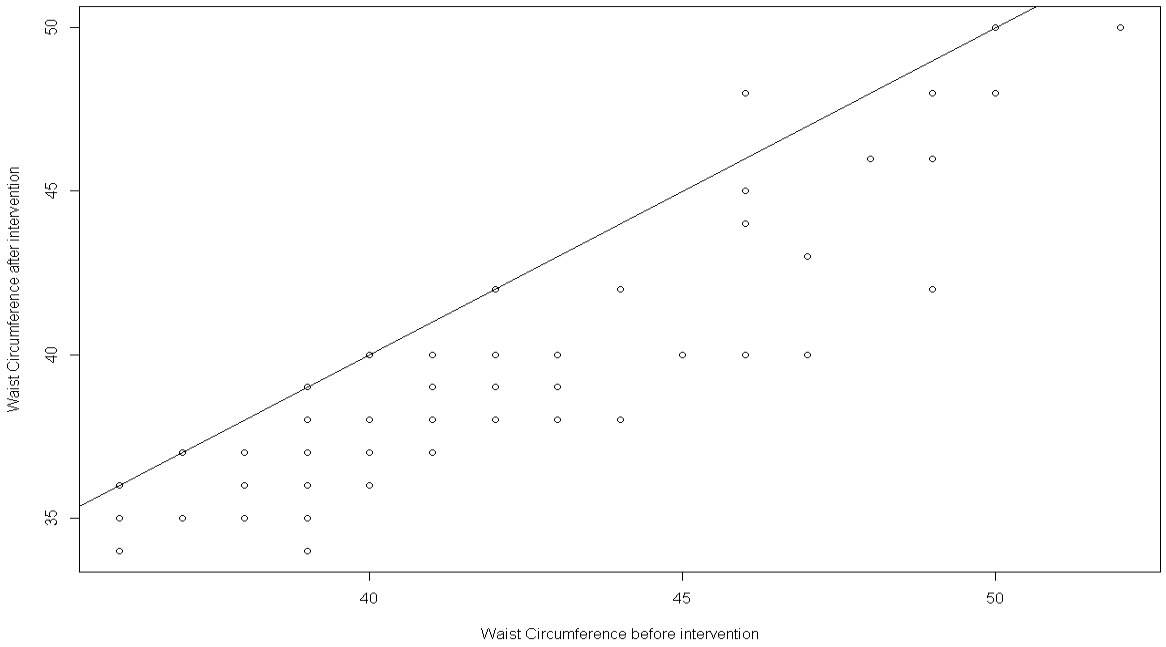

Figure 6. 5: Scatter Plot of the Waist Circumference

As depicted in Figure 8:13 of the waist circumference before and after intervention, majority of the points are lying below the line which accounts to the fact that there was a much reduction in waist circumference after participants going through the intervention. To confirm this decrease, the test statistics and the p-value was t=10.65 and 0.000 respectively. The average waist circumference for participants before and after intervention was 41.3 and 39.03, respectively. The mean difference between the waist circumference before intervention and waist circumference after intervention is 2.27 which shows that the average waist circumference after intervention is low. Since the p=0.000, we conclude that there was a statistically significant improvement in the waist circumference of the participants post intervention. Deducing from the confidence interval value, there is 95% confidence in the fact that the mean changes in waist circumference before and after intervention is in the middle of 1.85 and 2.70. With the confidence interval as 95%, we can say that a significant difference exists in waist circumference before and after the intervention programme. This is because the confidence interval for the mean difference excludes zero.

Similar to this study, Saboya et al., (2017) further revealed, after their study that the relationship in participants waist circumference was statistically significant. In similar context,

Yoon et al., (2014) also stated in their study that abdominal obesity reduced in women after a 3 months intervention. However, unlike the current study, Yoon et al., (2014) used the multi-component intervention theory which consisted of classes held for health education, individualistic health counseling, and a booklet and newsletters for self-management. Consistent with these results, Mathieu et al., (2008) in an old study, also indicated that there was a significant fall in waist circumference after engaging participants in a 10-weeks exercise intervention, although the duration for their intervention was shorter than the current study.

- **High Density Lipoprotein (HDL)**

  For HDL, 52(74.3%) had abnormal HDL, while 18(25.7%) had Normal HDL before the intervention. The results further revealed that, 12(17.1%) participants had abnormal HDL while 58(82.5%) participants had Normal HDL after the intervention. The mean HDL also increased after the intervention. Below is a boxplot indicating an improvement in Participants' HDL.

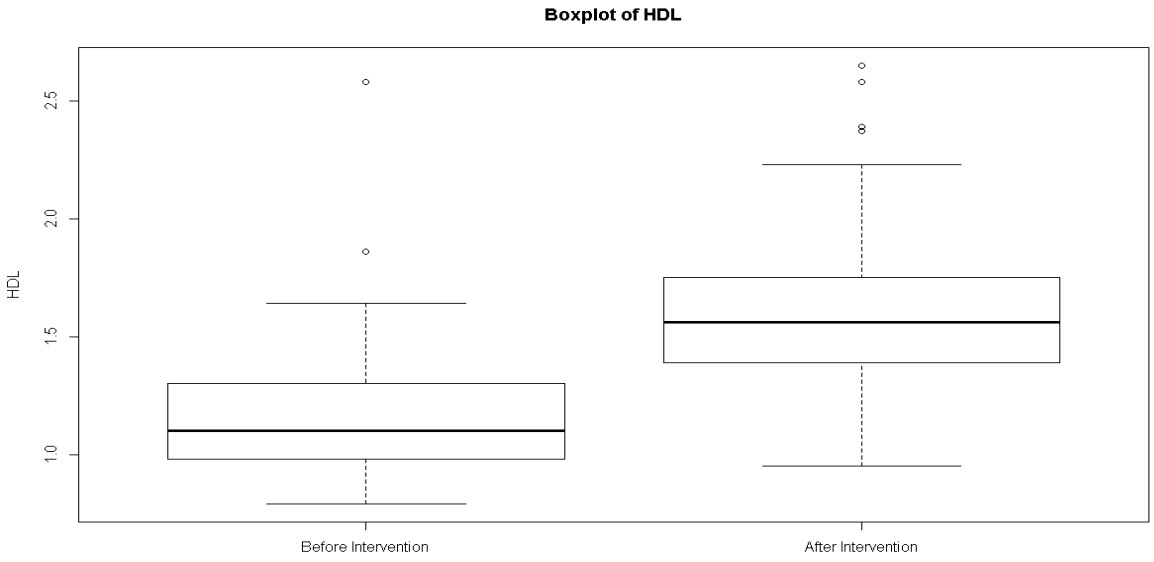

Figure 6. 6: Boxplot of HDL

From Figure 6.14, it appears there was a critical change in HDL of the members after the intervention. The means HDL after the medications a higher than before the intercession.

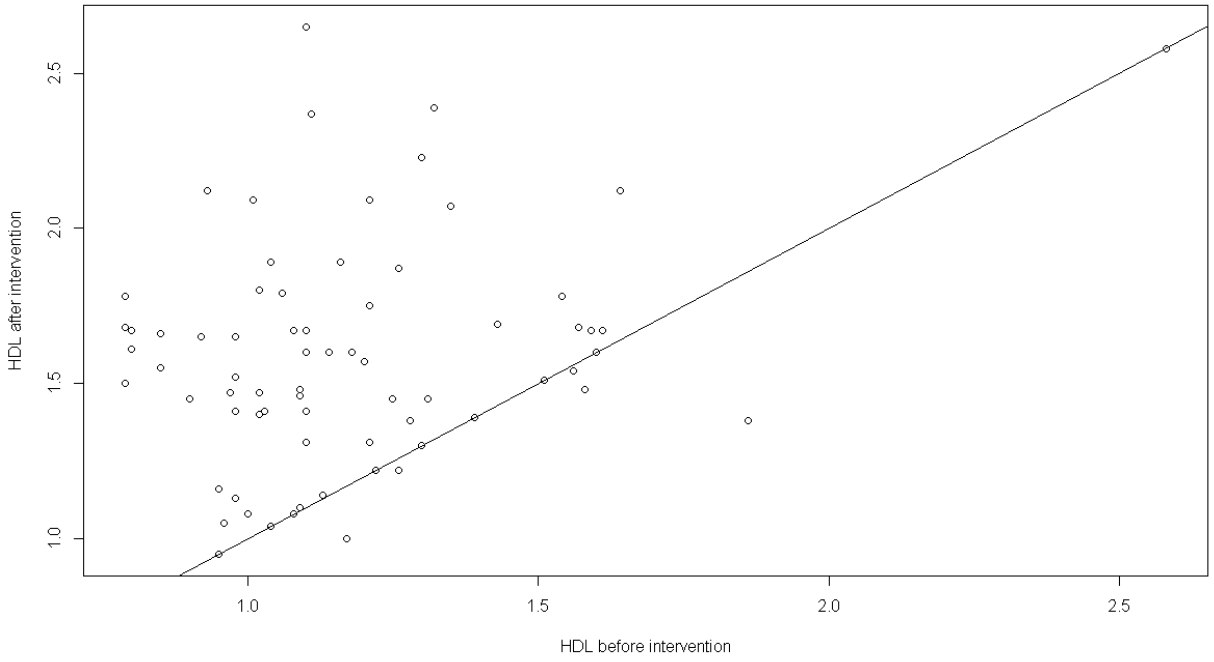

Figure 6. 7: Scatter Plot of the HDL

From the dissipate plot of the HDL when treatment, the majority of the focuses lie over the 45-degree line which means that there was an increase in HDL after the intervention. The test statistics was t=8.7 and the statistical significance p-value was 0.000. The statistical average HDL for participants before and after intervention 1.1 and 1.6, respectively. The mean difference between the HDL before intervention and after intervention is 0.4 which means that the normal HDL after intercession is higher. Since the p-value is critical, we reason that there was statistical improvement in the HDL of the participants after the treatment program since the certainty interval for the mean difference does exclude zero. According to the confidence interval value set, we are 95% sure that the mean distinction in HDL pre and post intervention is somewhere in the range of 0.3 and 0.5. In view of this 95% certainty, we can presume that there is a factually significant difference in HDL after the intervention.

This result corresponds with Lee et al., (2016) who again averred that physical movement had ideal impacts toward increasing HDL. In a similar fashion, Borkoles et al., 2016) also indicated that metabolic improvements were evident for high-density lipoprotein cholesterol. The

researchers however used a period of one year for pilot testing their study while the current study used a three-month period. Identically, Gerstel et al, 2013 further revealed an increase in HDL of the intervention group in their study. Likewise, Lerman (2011) also indicated an increase in HDL cholesterol. However, these studies were all randomized control trials, which required a control and an intervention group, but the current study applied the one-group pre and post-test design.

- **Triglycerides (TGL)**

For triglycerides (TGL), 64(91.4%) had normal TGL while only a minority of 6(8.6%) participants had high TGL before the intervention. The post intervention results brought to fore that, all 70(100%) participants had normal TGL after the MetS intervention.

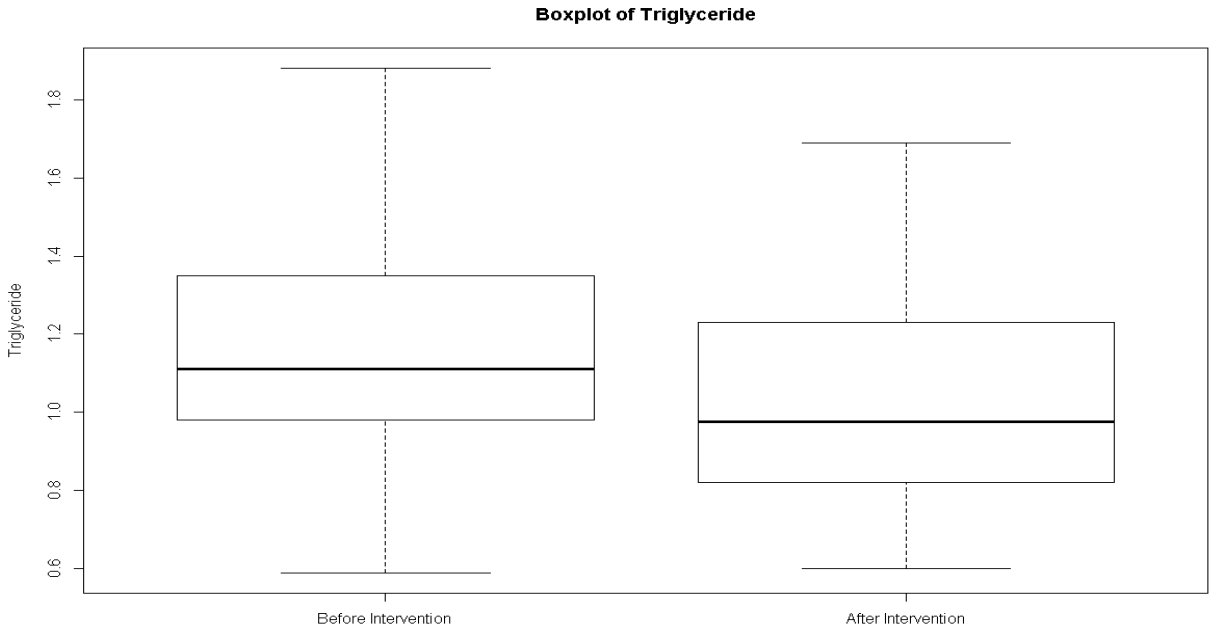

Figure 6. 8: Boxplot of TGL

From the Figure 6.16 above, it is obvious that there was an adjustment in the triglyceride of the members after the intervention. The mean triglyceride after the intervention is much lower than before

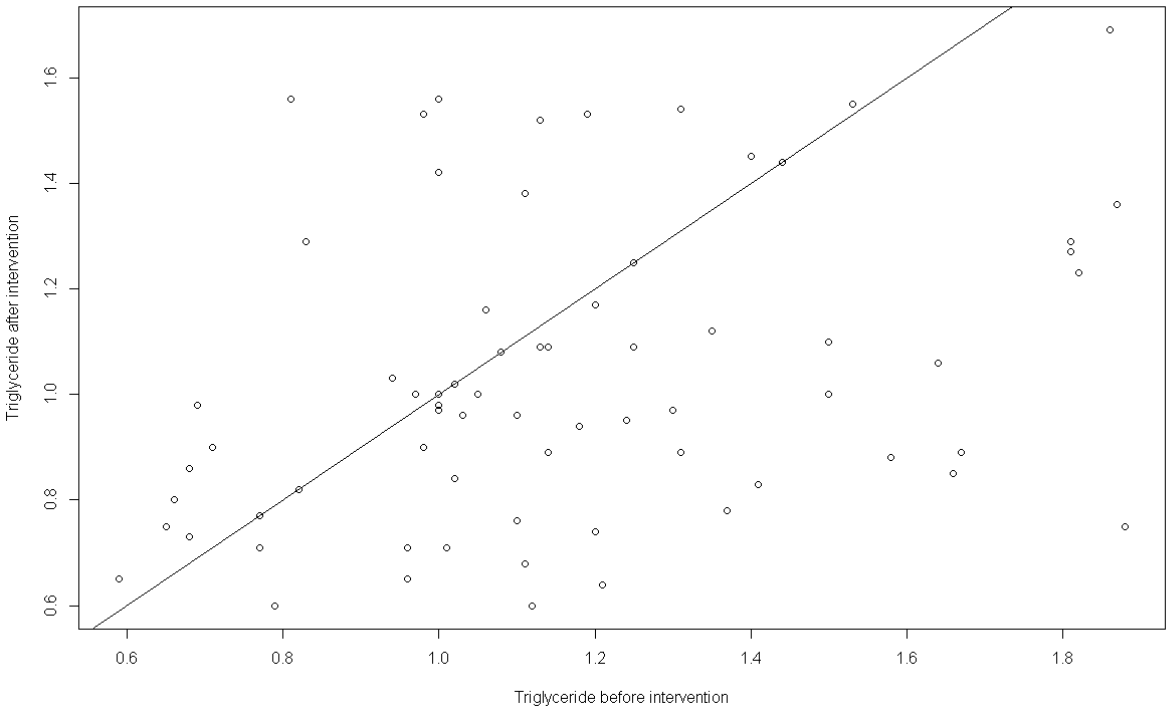

Figure 6. 9: Scatter Plot of the Triglyceride

From the disperse plot of the triglyceride before and after treatment, the majority of the focuses lie underneath the 45-degree line which means that there was an abatement in triglyceride after the mediation. The test statistics, t=3.16, also the p-value is 0.0024. The average triglyceride for participants before and after intervention was 1.16 and 1.03, respectively which indicated a decrease in the mean triglyceride. The mean difference between the triglyceride before intervention and triglyceride after intervention is 0.13 which is an indication that the average triglyceride after intervention is higher. Since the p-value is significant, we conclude that there existed a statistically worthy improvement in the triglyceride of the participants after the intervention programme. From the confidence interval value, we are 95% sure that the mean contrast in triglyceride pre and post intervention is somewhere in the range of 0.05 and 0.22. In light of this, we can reason that there is a statistically huge difference in triglyceride after the intervention program since the certainty interval for the mean contrast does exclude zero.

Correspondingly, Blackford et al., (2016) also revealed that a six-month physical activity, nutrition, and weight management significantly improved several metabolic syndrome parameters including triglycerides and cardiovascular risk factors for their participants. In the same vein, Verrusio et al., (2016) further reported that there was a significant decrease in the blood triglyceride levels of their participants. Comparably, Lee, Kim, & Jeon (2016) also indicated that physical activity had positive impacts toward decreasing triglycerides and decreasing the occurrence of metabolic syndrome in general. The study further affirmed that the most minimal prevalence of metabolic disorder was seen when lively physical activity was conducted six times each week.

- **Fasting Blood Sugar (FBS)**

The analysis further unveiled that before participants were subject to the MetS intervention, 31(44.3%) had normal Fasting Blood Sugar (FBS). while 39(55.7%) had high FBS. The number of participants with high FBS reduced to 24(34.3%) after the intervention. The percentage of normal FBS participants increased to 46(65.7%). The results is further presented in the box plot below.



Figure 6. 10: Boxplot of Fasting blood sugar (FBS)

From the Figure 6.18 outline above, it is apparent that there was an adjustment in the fasting glucose after the intervention. The mean fasting glucose after the intervention is much lower than before the mediation.

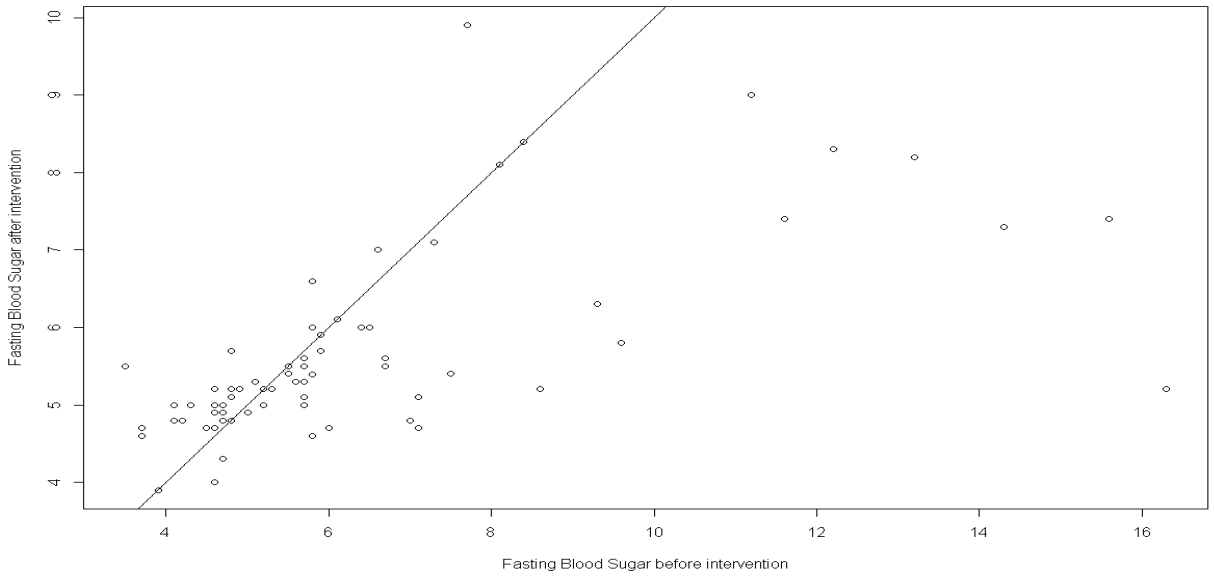

Figure 6. 11: Scatter Plot of the Fasting Blood Sugar

From the dissipate plot of the fasting glucose when treatment, the vast majority of the points lie beneath the 45-degree line which means that there was a decline in the fasting glucose after the mediation. The test statistics, t=3.05 and the p-value is also depicted as 0.003. The mean fasting glucose for members before and after intervention was 6.45 and 5.65, receptively. The mean contrast between the fasting glucose before and after interventions is accounted for as 10.81 which means that the normal fasting glucose after mediation is lower. Since the p-value is significant, we infer that there was a measurably huge improvement in the fasting glucose of the members after the intervention program.

The confidence interval of 95% certainly confirms that the average difference in fasting blood sugar before and after intervention is between 0.28 and 1.33. From this, the 95% confidence interval concludes that there is a statistically significant difference in fasting blood sugar after the intervention programme since the confidence interval for the mean difference does not include zero. For FBS, the mean for participants before and after intervention was 6.45 and 5.65, respectively with a mean difference of 10.81. This is indicative that the average fasting blood sugar of participants reduced after the MetS intervention although the average FBS post intervention was found to be high per the IDF's criteria for MetS.

In agreement with this result, Verrusio et al., (2016) also brought to fore the fact that the FBS of their participants significantly reduced after an exercise and diet intervention programme. However, Verrusio et al., (2016)'s intervention lasted for a period of six months unlike the current study which had a duration of three months. The results is also in accordance with Gerstel et al., (2013) who also reported a significant decrease in their participant's FBS after a period of 12 weeks MetS intervention programme. This implies that intervention programmes for MetS positively influence the reduction of MetS.

- **Blood Pressure (BP)**

  The results for BP revealed a reduction in both systolic and diastolic blood pressure. 53(75.7%) of Participants' had high BP before the intervention. This reduced to 33(42.1%) after the intervention. This indicates a significant improvement. The average systolic and -diastolic BPs also reduced and this is shown in the boxplot below:

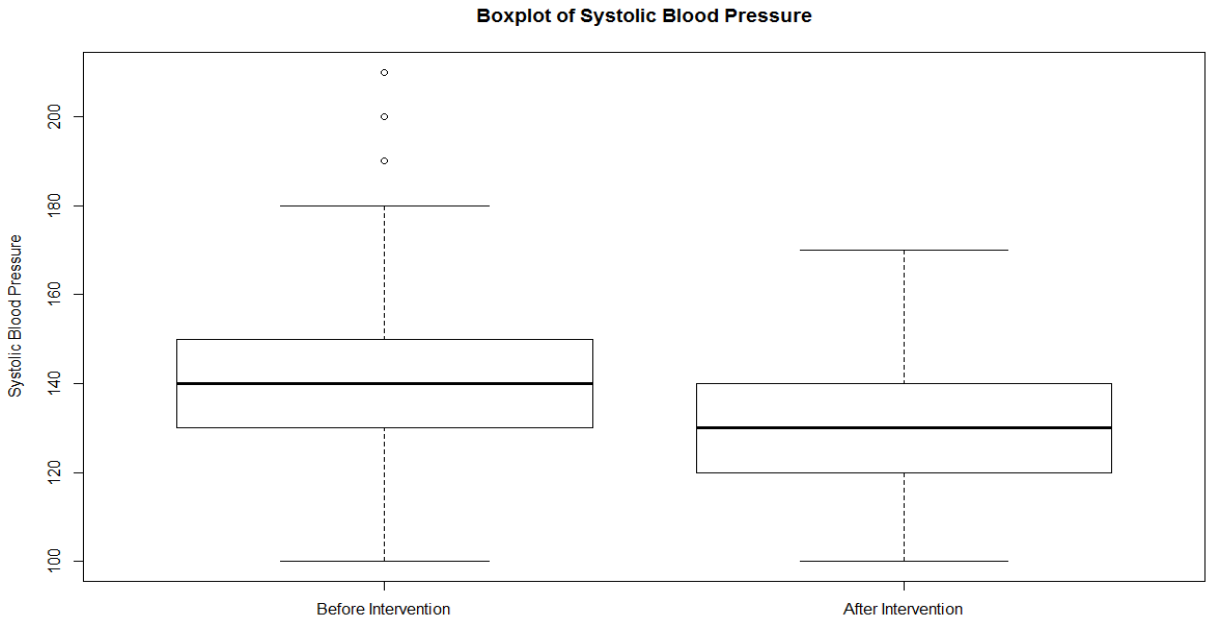

Figure 6. 12: Boxplot of Systolic Blood Pressure

From the Figure 6.20 outlined above, it is clear that there was an adjustment in the systolic pulse after the intervention. The mean systolic pulse after the intervention is a lot littler than before the intervention.

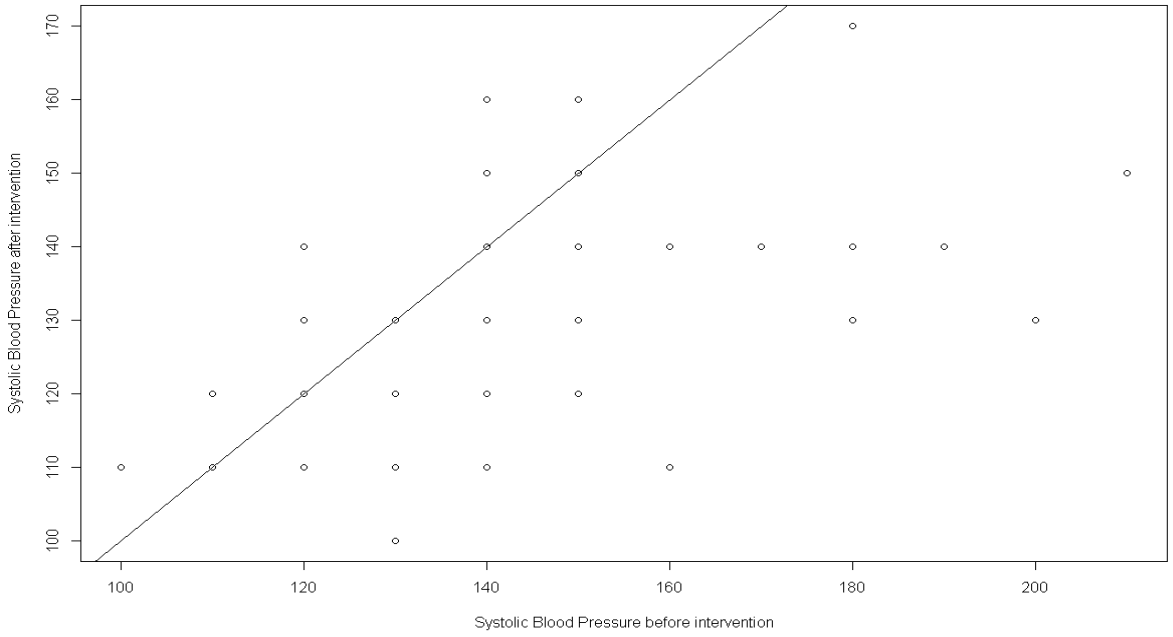

Figure 6. 13: Scatter Plot of the Systolic Blood Pressure

From the Figure 6.21 of the SBP before and after intervention, most of the focuses lie below the 45-degree line which is an indication that there was a decline in SBP after the treatment was given to the participants. The test statistics, t=5.72 and the p-value is 0.000(i.e. $p<0.001$. The mean systolic blood pressure for participants before and after intervention 143.3 and 130.4, respectively. The mean difference between the systolic blood pressure before intervention and after intervention is 12.86 which is an indication that the average systolic blood pressure after intervention is lower. Since the p-value is significant, we reason that there was a factually significant improvement in the systolic circulatory strain of the participants after the treatment program.

From the interval of confidence, we are 95% sure that the mean distinction in systolic circulatory blood pressure before and after is somewhere in the range of 8.37 and 17.34. In light of this 95% certainty interval, we can conclude that there is a measurably significant distinction in systolic circulatory blood pressure after the intervention program since the certainty interval for the mean contrast does exclude zero.

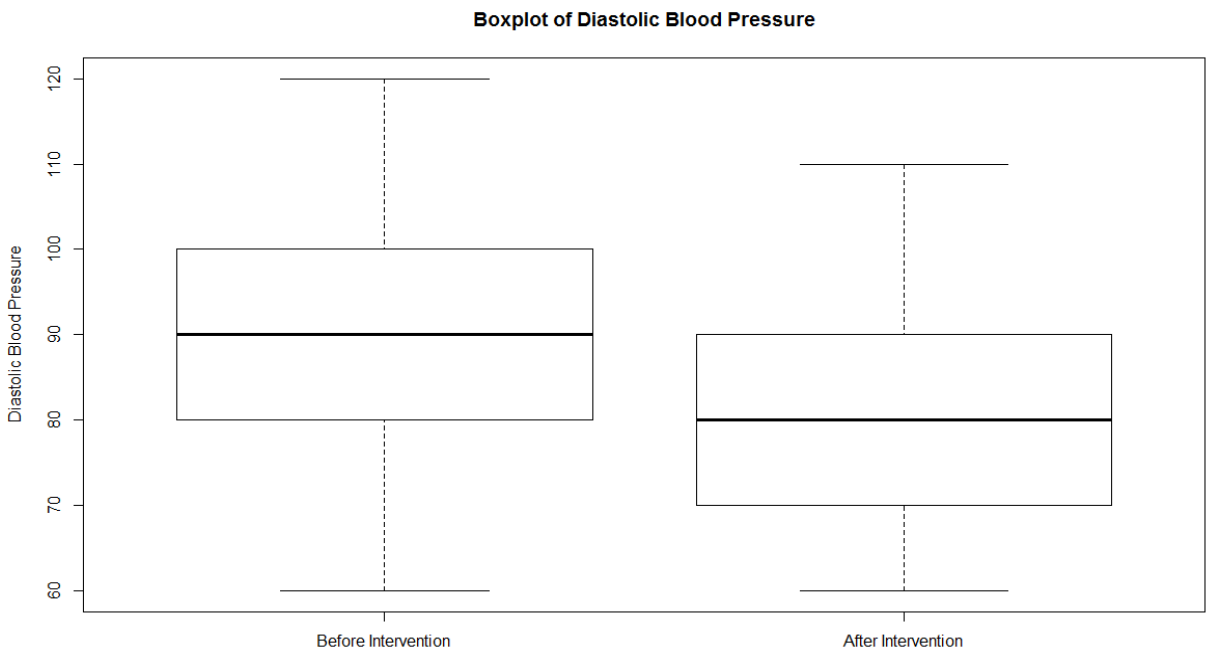

Figure 6. 14: Boxplot of Diastolic Blood Pressure

From the Figure 8.22above, it is clear that there was an adjustment in the diastolic circulatory blood pressure of the members after the intervention. The mean diastolic circulatory blood pressure after the intervention is a lot littler than before the intervention.

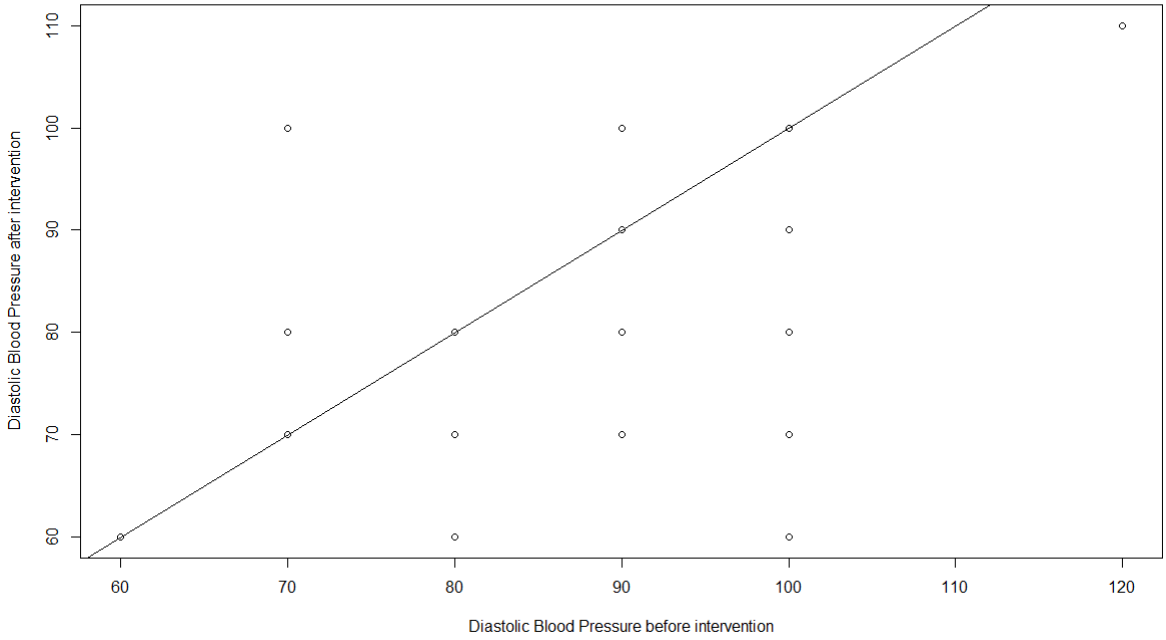

Figure 6. 15: 23 Scatter Plot of Diastolic Blood Pressure

From the dissipate plot of diastolic circulatory blood pressure when treatment, the vast majority of the focuses lie beneath the 45-degree line which means that there was a decline in the diastolic blood pressure after the intervention. The test statistics, t=4.28 and the p-value is 0.000. The mean diastolic blood pressure for participants before and after intervention are 87.71 and 81.71, respectively. The average difference between diastolic blood pressure before intervention and after intervention is 6.0 which is an indication that the average diastolic blood pressure after intervention is lower. Since the p-value is significant, we conclude that there was a statistically significant improvement in the diastolic blood pressure of the participants after the intervention programme.

Based on the confidence interval value, we are 95% certain that the average difference in diastolic blood pressure before and after intervention is between 3.21 and 8.79. From this 95% confidence interval, we can confirm that, there is a statistically significant difference in diastolic blood pressure after the intervention programme since the confidence interval for the mean difference does not include zero.

Consistent with this results Verrusio et al., (2014), again reported that an increase in activity gave the best results and health benefits which included a significant reduction in

systolic and diastolic blood pressure among the various groups of participants used for the study. In a similar study, Owlasiuk et al., (2014) also revealed a reduction in blood pressure of their participants after an intervention. Comparably, Lerman. (2011) also reported that systolic blood pressure significantly reduced at 12 months in both of his study groups. In like manner, Blackford et al., (2016) again indicated that systolic blood pressure reduced after a three-month intervention.

- **Body mass index (BMI)**

The results again brought to fore that, for BMI, 54(77.1%) were obese, while 16(22.9%) participants were overweight before the intervention. The post intervention results showed that, the number of obese participants reduced to 49(70.0%), while 21(30.0%) were overweight. The mean BMI of participants again reduced after the intervention as shown in the boxplot below:

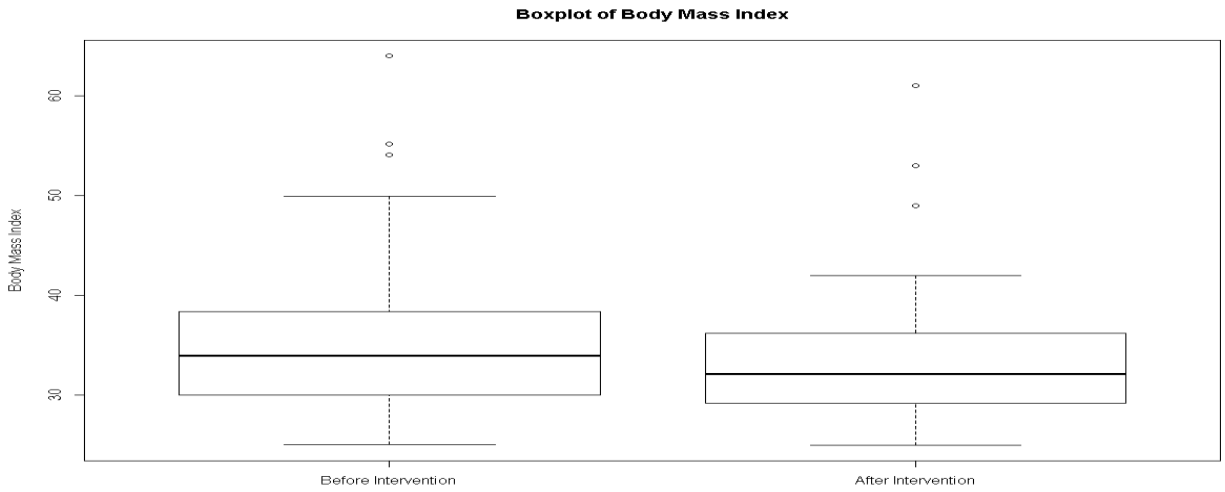

Figure 6. 16: Boxplot of BMI

From the figure 6.24 outlined above, it was revealed that there was an alteration in the body mass index of the participants after the intervention. The average body mass index after the intervention was much less than before the intervention.

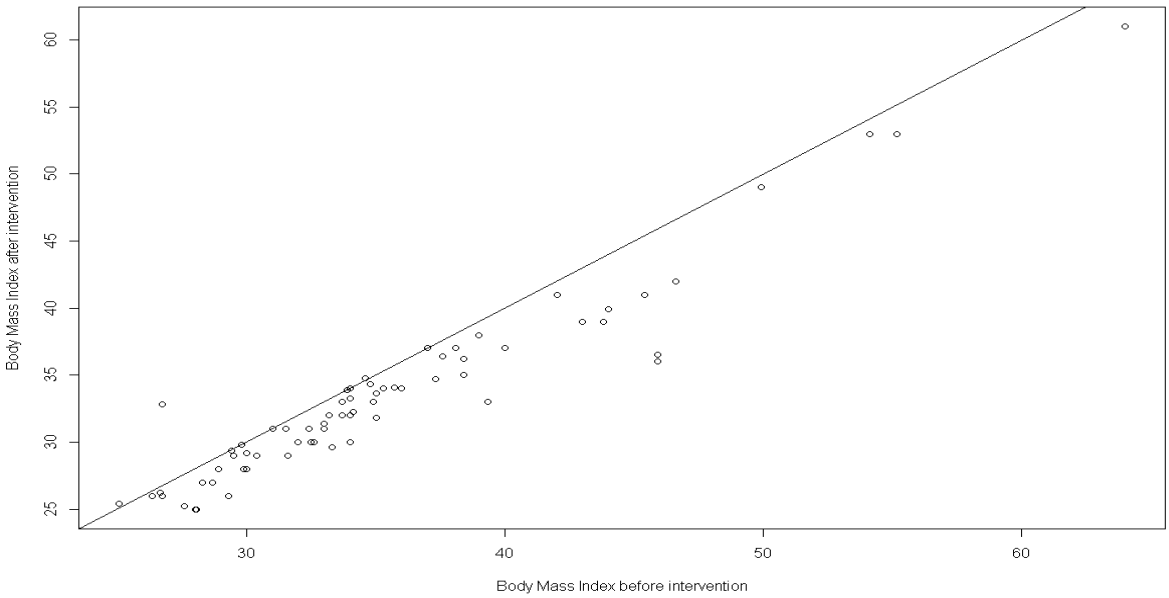

Figure 6. 17: Scatter Plot of the BMI

From the Figure 6.25 outlined above shows, the body mass index before and after treatment, most of the points were scattered beneath the 45-degree line which means that there was a decline in body mass index after the intervention. The p-value after analysis was 0.000, also test statistics, t=7.56. The average body mass index for participants' pre and post intervention was 35.35 and 33.43, respectively. The mean distinction of body mass index before intervention and body mass index after intervention is 1.92 which signifies that the average body mass index after intervention is less than before. Since the p-value is significant, we presume that there was a statistically significant appreciation in the body mass index of the participants after the intervention programme.

Based on the confidence interval, we are 95% certain that the average distinction in body mass index for both interventions lies somewhere in between the range 1.41 and 2.43. From this 95% certainty interval, we can infer that there is a statistically huge change in body mass index after the intervention programme.

Finally, the mean body mass index for participants before and after intervention was 35.35 and 33.43, respectively and the mean difference was 1.92 which signifies that the average body mass index after intervention was lower.

This result tallies well with Owlasiuk et al., (2014)'s study which revealed a significant difference in body mass and hence a BMI improvement. Similarly, Erman, 2011 also reported that Body weight significantly decreased after the intervention.

In the same vain, Blackford et al., (2016) found a significant reduction in body mass index among their participants after a three-month intervention. In a rather older study, Kousar et al., (2008) also reported that after a 12-week culturally appropriate intervention, BMI improved. In contrast, Borkoles et al., (2016) on the other hand, found no significant difference for body mass index. The current study revealed that there was a tremendous improvement in participants' BMI and MetS indicators after a three-month MetS intervention. In a similar vein, Saboya et al., (2017) also reported from their study that after a 12-weeks (3 months) exercise, diet and self-care intervention, obtained a positive effect on Mets.

Table 6. 7: Age against Metabolic Syndrome Variables (Pre intervention, n=70)

AGE GROUP	***WC***		***BMI***		***HDL***		***TRIG***		***FBS***		**BP**		
	High	Normal	Obese	Overweight	Abnormal	Normal	High	Normal	High	Normal	High	Normal	Low
20-29	1	0	1	0	1	0	1	0	0	1	1	0	0
30-39	6	0	6	0	5	1	0	6	3	3	4	1	1
40-49	20	0	17	3	16	4	1	19	13	7	13	7	0
50-59	31	0	21	10	21	10	2	29	18	13	24	7	0
60-69	12	0	9	3	9	3	2	10	5	7	11	1	0

Table 6. 8: Age against Metabolic Syndrome Variables (Post- Intervention, n=70)

Age group	***WC***		***BMI***		***HDL***		***TRIG***		***FBS***		BP		
	High	Normal	Obese	Overweight	Abnormal	Normal	High	Normal	High	Normal	High	Normal	Low
20-29	1	0	1	0	0	1	0	1	0	1	0	1	0
30-39	4	2	6	0	2	4	0	6	2	4	1	4	1
40-49	19	1	16	4	6	14	0	20	6	14	9	11	0
50-59	26	5	19	12	4	27	0	31	12	19	16	15	0
60-69	8	4	7	5	0	12	0	12	4	8	7	5	0

The pre and post-intervention results of the study depicts from the two tables above that, majority of the participants had abnormal waist circumference, BMI, HDL, and FBS readings with the numbers increasing till 50-59years before the intervention, where the peak readings then began to slope again. Notwithstanding the above, the results showed that, all the MetS indicators, reduced after the intervention irrespective of age distribution.

Table 6.8 depicts that BMI, WC, BP and FBS gradually kept increasing with age while Lower HDL was also found to be associated with ageing before and after the MetS intervention. The majority of participants, were however within the age range of 50-59years. This affirms Okafor (2012)'s assertion that MetS increases with age.

Table 6. 9: BMI against Metabolic Syndrome Variables (Pre and Post Intervention)

	PRE-INTERVENTION			**POST-INTERVENTION**		
METS VARIABLES	**Description**	**Obese**	**Overweight**	**Description**	**Obese**	**Overweight**
FBS	High	31	8	High	13	11
	Normal	23	8	Normal	26	10
TRIG	High	4	2	High	49	21
	Normal	50	14	Normal	0	0
HDL	Abnormal	41	11	Abnormal	9	3
	Normal	13	5	Normal	40	18
WC	High	54	16	High	45	13
	Normal	0	0	Normal	4	8
BP	High	40	13	High	26	7
	Normal	13	0	Normal	22	0
	Low	1	3	Low	1	14

From table 6.9 above, the results depicts that majority of the participants who were obese also recorded high levels of FBS 31(57.4%), abnormal HDL 41(75.9%), and abnormal Waist Circumference 54(100%), but had normal TRIG 50(92.6%) before the intervention. Majority of the participants who were obese also recorded normal levels of FBS 26(66.67%), normal TRIG 49(100%), and normal HDL 4(81.6%) after the intervention. They however recorded abnormal Waist Circumference 45(91.8%).

Similarly, majority of the participants who were overweight also recorded slightly high levels of FBS 11(52.4%), normal TRIG 21(100%), normal HDL 18(85.7%), and abnormal Waist Circumference 21(61.9%) after the intervention. This implies that, irrespective of the BMI distribution, there were improvements in participants MetS parameters after the intervention even though some still had high waist circumferences. In a similar context, Khalid et al., (2018) also reported that, the mean of BMI among MetS positive participants was statistically significant, negatively correlated with increasing or advanced age. The researchers in conclusion stated that the prevalence of metabolic syndrome among obese Saudis is relatively high, and old age and obesity can be regarded as related factors.

Table 6. 10: MetS Status of Participants (n=70) Pre and Post Intervention

	Pre-intervention	Post intervention
Negative	0(0%)	4(5.7%)
At-Risk	0(0%)	49(68%)
Positive	70(100%)	17(24.3%)

Table 6.10 presents the prevalence of MetS among participants who participated in the pilot study before and after the intervention. From the table, all (100%) participants before the intervention, tested positive for MetS, none of them was negative or at risk. However, after the intervention, 49(68%) were found to be at risk, 17(24.3%) still tested positive for MetS, while 4(5.7%) were negative for MetS. Mets prevalence is therefore said to have reduced by 5.7%. This indicates an improvement and a reduction in MetS prevalence among the participants after the intervention

In a similar vein, Baetge et al., (2017) also averred that, advertising companies offering diet and exercise programs appeared to provide improvements in Mets by public education and check-up.

6.5.2 Secondary Outcomes

The secondary outcome of the intervention was evaluated by re-assessing the market women's knowledge of metabolic syndrome and their quality of life and comparing with the pre-intervention results. These are presented below:

6.5.2.1 Knowledge of MetS

6.5.2.1.1 Data Collection Instrument

The market women's knowledge of Metabolic syndrome was evaluated using See et al., (2010)'s K-Ms scale (Appendix 4).

6.5.2.1.2 Data Analysis

Data were imported into Statistical software package "STATA" version 13.0. Descriptive and inferential statistical tests were then used to summarize, and present the data, while the paired T-test was used to compare the pre and post intervention data with the aim to access the success of the MetS intervention programme.

6.5.2.1.3 Results and Discussion

Table 6. 11 :Pre-Intervention Knowledge of Metabolic Syndrome Prevention (Frequency (n) and Percentages (%)

		PRE-INTERVENTION		POST-INTERVENTION	
Question no	**Questions**	**Correct**	**Incorrect**	**Correct**	**Incorrect**
Question 1	Which of the following is not a risk factor for heart disease and stroke (MetS)?	10(14.3)	60(85.7)	49(70)	21(30)
Question 2	Which of the following best describes a woman's waist too big?	4(5.7)	66(94.3)	9(12.9)	61(87.1)
Question 3	Which best describes "High Blood Pressure"?	4(5.7)	66(94.3)	10(14.3)	60(85.1)
Question 4	Which best describes the criteria for "High Fasting Blood Sugar?"	0(0)	70(1000	56(80)	14(20)
Question 5	Which of the following is not directly related to *"Waist is too big (abdominal obesity)"?*	22(31.4)	48(68.6)	38(54.3)	32(45.7)
Question 6	What are the complications that result from suffering heart and blood vessel diseases (MetS)?	15(21.4)	55(78.6)	52(84.3)	18(25.7)
Question 7	What habits lead to the risk of developing heart diseases, high blood cholesterol, high blood sugar and high blood pressure (MetS)?	60(85.7)	10(14.3)	66(94.3)	4(5.7)

Question 8	Which of the following is not a self-care way to prevent heart diseases, high blood pressure, high blood sugar, dyslipidemia and abdominal obesity (MetS)?	55(78.6)	15(21.4)	61(87.1)	9(12.9)
Question 9	Which is not true in the medical treatment or care for people with heart diseases, high blood sugar, high blood pressure, high blood cholesterol and abdominal obesity (MetS)?	64(91.4)	6(8.6)	66(94.3)	4(5.7)

Table 6.11 indicates that all the seventy (n=70) participants' respondents to nine questions asked to understand the knowledge they had with respect to Metabolic Syndrome before and after the MetS intervention.

The results in Table 6.11 above depict that for question one, the majority of the participants, 60(85.7%) gave wrong responses while only 10(14.3%) out of the total 70 participants were able to answer correctly before the intervention. After the intervention, majority of the participants, 49(70%) were able to give right responses whilst only 21(30%) out of the total 70 answered incorrectly.

Secondly, 66(94.3%) participants answered incorrectly to the second question, while only 4(5.7%) participants were able to answer it correctly before the intervention. Again for the post intervention results, 61(85.7%) answered incorrectly to the second question, while 9(12.9%) respondents were able to answer it correctly indicating a slight improvement.

The results of the test on the knowledge of MetS among the market women for question three depicted that 56(80%) knew what best described "High Blood Pressure" and therefore answered correctly, while 14(20%) said they did not know what best described "High Blood Pressure" and so answered incorrectly after the intervention as compared to a significant majority of 48(68.6%) incorrectly to this knowledge question before the intervention, with only 22(31.4%) answering correctly.

The results of the test on the knowledge of MetS among the market women for question four before the intervention depicted that all the participants 70(100%) did not know what was best described as "High Fasting Blood Sugar" and so answered wrongly. Participants' knowledge on this question however improved after the intervention as 56(80%) participants answered correctly to the question while the remaining 14(20%) participants failed to answer correctly.

Furthermore, when participants were asked about complications that resulted from suffering heart and blood vessel diseases, only 15(21.4%) knew the correct answer as "stroke". A significant majority of 55(78.6%) as shown on table 1 above were unable to identify the correct answer before the intervention. This suggested that participants had minimal knowledge and awareness of the complications which resulted from heart and blood vessel diseases. The post intervention results however, revealed a slight increase of 38(54.3%) knowing the correct answer as "stroke" while 32(45.7%) were still unable to identify the correct answer even with the health education.

Again, the results of sixth knowledge question asked as represented in Table 8.11 above revealed that majority of participants 66(94.3%) answered wrongly to this question before the intervention, but the remaining 4(5.7%) participants were able to give correct answers to the question. The post intervention results revealed that, majority of participants 52(74.3%) still answered incorrectly to the question while, the remaining 18(25.7%) were able to give correct answers to the question indicating a minimal increase in participants' knowledge after the intervention.

In addition to that, a critical look at the results further revealed that with regards to the analysis of knowledge data for the habits which led to the risk of developing MetS, Participants' knowledge about this question was appreciative as a significant majority of

60(85.7%) were able to answer correctly before the intervention. A small number of 10(14.3%) participants however answered incorrectly. This suggested that participants were much informed about the risk factors for MetS. Participants' knowledge about this question further improved after the intervention as a significant majority of 66(94.3%) were able to answer correctly. A small number of 4(5.7%) however answered incorrectly.

Participants were again asked to select what was not a self-care way to prevent MetS. Majority 53(75.7%) of the respondents knew the correct answer while 17(24.3%) participants answered incorrectly to the question before the intervention. This improved to 61(87.1%) who knew the correct answer while 9(12.9%) participants answered wrongly to the question after the intervention.

Finally, participants were asked to indicate what was not true in the medical treatment or care for people with. . A significant majority of 64(91.4%) provided the correct response. Contrary to the view of those who answered correctly another minority of 6(8.6%) did not have knowledge about the medical treatment of MetS before the intervention. The number of participants who answered correctly to this question increased again after the intervention as 68(97.1%) answered correctly while a minority of 2(2.9%) did not have knowledge about medical treatment of MetS. It was concluded that participants had little knowledge on Metabolic Syndrome generally hence, needed to be educated on it.

Table 6. 12: Age and Knowledge Score
Pre and Post Intervention

	Pre-intervention	Post-intervention
Age Group	Mean Knowledge	Mean Knowledge
20-29	33.3	77.8%
30-39	37.0	66.7%
40-49	39.4	62.8%
50-59	39. 4	65.6%
60-69	27.8	66.7%

Table 6.12 depicts that on the average, participants who were within the age range of 40-49 and 50-59year group both had the highest knowledge score of 39.2%, before the

intervention. However, after the intervention, the 20-29year group had the highest score of 77.8%. This notwithstanding, all the age groups had a tremendous improvement in knowledge after the MetS intervention.

Table 6. 13 : Total Knowledge Score (Frequency and Percentages, N=70)

Total knowledge Score	Pre-intervention	Post-intervention
Score below 50%	60(85.7%)	7(10%)
Score above 50%	10(14.3%)	63(90%)

Table 6.13, depicts that 10(14.3%) participants had a total knowledge score of above 50% while 60(85.7%) scored below 50 before the Mets intervention. The total knowledge score of participants increased after the intervention as follows: 7(10%) participants had a total knowledge score of below 50% while 63(90%) scored above 50 as shown on the table above.

Table 6. 14: Descriptive Analysis for Knowledge of MetS Score

	PRE-INTERVENTION				POST- INTERVENTION			
Variable	Minimum	Mean	Maximum	Std. Deviation	Minimum	Mean	Maximum	Std. Deviation
Age	28	51	65	8.3	28	51	65	8.3
Knowledge	0.0	37.1	66.7	13.0	22.2	67.6	88.9	8.4

A comparison of the descriptive statistics of participants' knowledge of MetS score before and after the intervention reveals a mean knowledge score of 37.1% and 67.6% respectively, indicating an improvement in knowledge of MetS. This is represented by the boxplot below:

Evaluation of Results of Pre and Post Intervention Knowledge of Mets

PAIRED T TEST

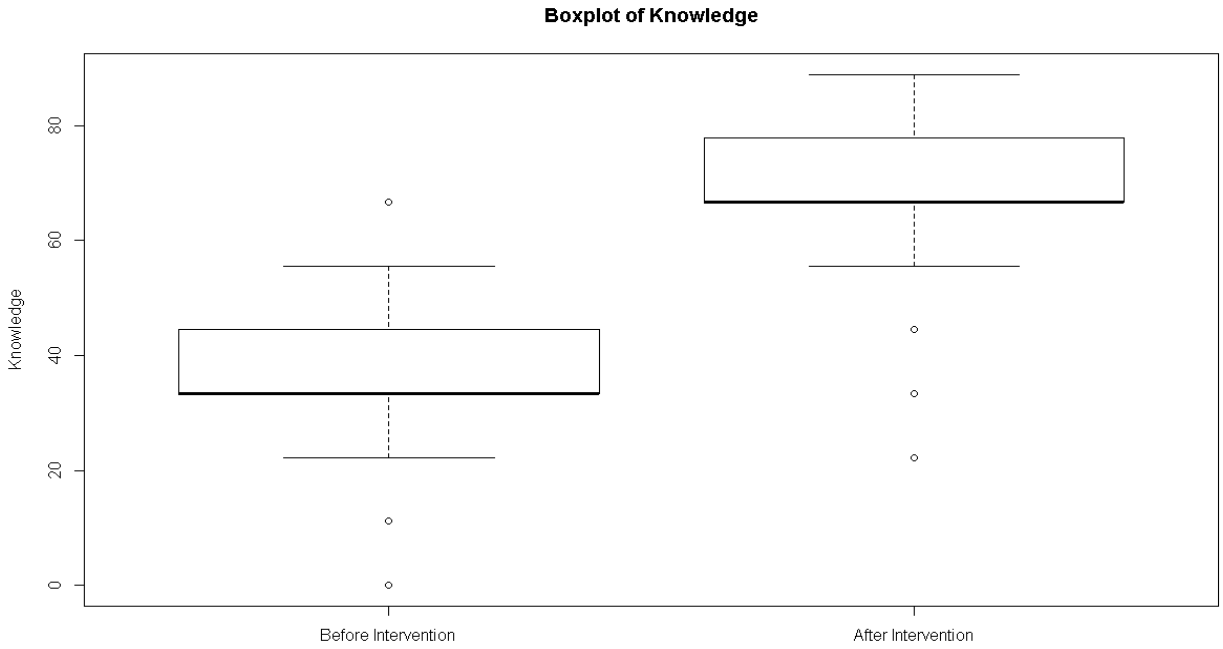

Figure 6. 18: Boxplot of Knowledge of MetS

From the Figure 6.26 outlined above, it is evident that there was a change in knowledge of the members after the given treatment. The average knowledge after the intervention is much higher than before the intervention.

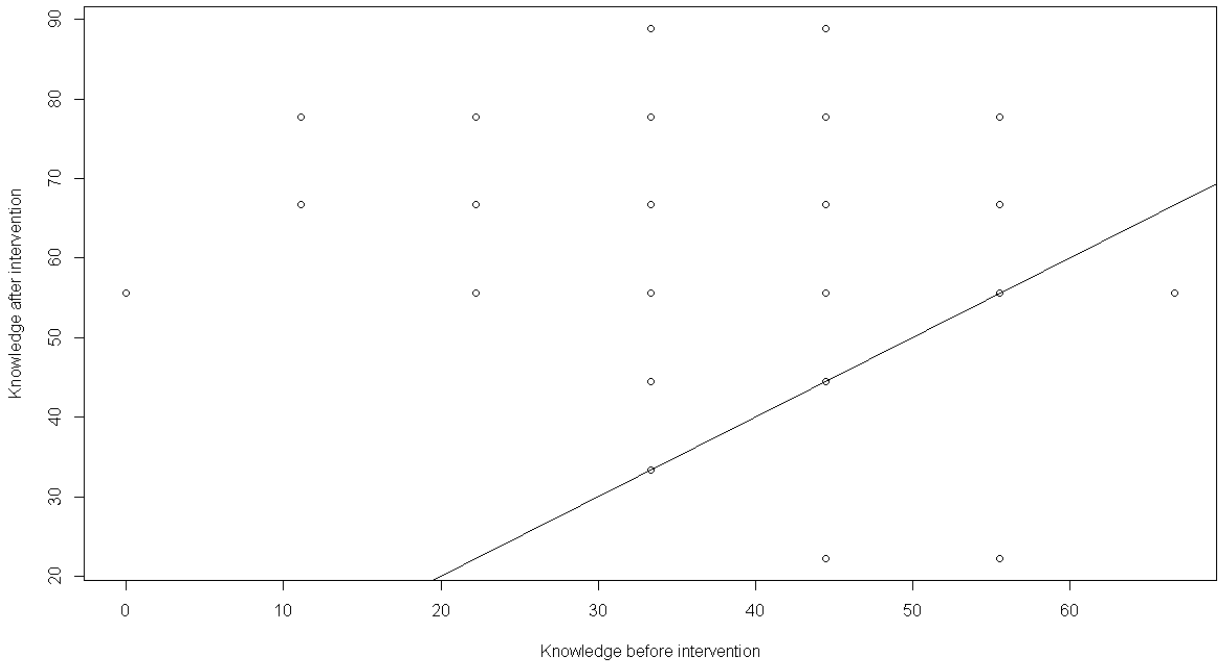

Figure 6. 19: Scatter Plot of the Knowledge

Figure 6.27 above, which depicts the knowledge of participants before and after treatment revealed that a vast majority of the focuses lie above the 45-degree mark, which means that there was an increase in knowledge after the intervention.

The test statistics, t=13.1, also the p-value is 0.000. The average knowledge for participants before and after intervention was 37.1 and 67.6, respectively. The mean distinction within knowledge before intervention and after is 30.6. This is an indication that the average knowledge after intervention is higher. Since the p-value is critical, we presume that there was a statistically worthiness and appreciation in knowledge of the participants after the intervention programme.

Using an alpha value of 0.05, there is 95% assurance that the average distinction in knowledge prior to and after the intervention ranged between 25.9 and 35.3. From simple inferential statistics, there is a so much difference with participants' knowledge after the treatment programme, since the confidence interval for the mean difference does not include zero.

Equivalent to the above results, Cortez et al (2018) also found out that students' knowledge of metabolic syndrome after an educational intervention increased from 20.9% to 55.8%.

The researchers further revealed that most students said they were able to change their lifestyle after the educational meetings. In conclusion, Cortez et al (2018) stated that educational intervention, promotes increased knowledge and stimulates changes in attitudes related to risk factors associated with MetS. However, different from the current study, which used, a combination of educational, diet and exercise intervention, Cortez et al (2018)'s study only employed an educational intervention.

In contrast Amarasekara, et al (2016) pointed out that participants had little knowledge in controlling their lifestyle activities such as smoking, diet and exercise, despite regular medical checkup.

The findings of the current study revealed that, an education programme on MetS could improve knowledge on MetS. This supports, Cortez et al., (2018)'s assertion that, educational intervention, promotes increased knowledge and stimulates changes in attitudes related to risk factors associated with MetS. Similarly, Lo et al., (2016) also recommended that concurrently, public health efforts regarding primary prevention of cardiovascular diseases should be targeted at improving MetS knowledge.

6.5.2.2 Quality of Life

This section describes a comparison of the pre and post-intervention results for participants' quality of life as part of the evaluation of the secondary outcomes of the MetS intervention programme. A Welch t test and Anova were used to compare the QOL domains and the MetS indicators, while the paired t test was used to compare the pre and post-intervention quality of life of participants.

6.5.2.2.1 Data Collection Instrument

The WHOQOL (2005) 26 item BREF questionnaire was used for data collection (Appendix 4)

6.5.2.2.2 Data Analysis

Data analysis was done using the test dataset and SPSS coding to place scoring on 3the WHOQOL-Bref (2005) ("WQ_BREF.TXT") and an SPSS code (called "WQ_BREF.SPS").

6.5.2.2.3 Results and Discussion

Demographic Features of Participants (N=70)

Table 6. 15: Demographic Features of Participants

VARIABLES	DESCRIPTION	FREQUENCIES & PERCENTAGES
AGE GROUP	20-29years	1(1.4)
	30-39years	6(8.6)
	40-49years	20(28.6)
	50-59years	31(44.3)
	60-69years	12(17.1)
EDUCATION	None	6(8.6)
	Primary	43(61.4)
	Secondary	19(27.1)
	Tertiary	2(2.9)
MARITAL STATUS	Divorced	10(14.3)
	Married	39(55.7)
	Single	4(5.7)
	Widowed `	17(24.3)

The table above presents the demographic features of the participants.

From the Table, only 1(1.4%) participant was within 20-29years, 6(8.6%) were within 30-39years, 20(28.6%) were within 40-49years, 31(44.3%) were within 50-59years, while 12 (17.1%) were within 60-69years Again the 50-59 year were the greatest majority.

The educational status distribution of participants again indicated that 6 (8.6%) had not received any form of education, 43 (61.4%) received primary education, 19(27.1%) received secondary education, while 2 (2.9%) received tertiary education. This again indicates that the population was moderately literate.

For marital status, participants 10 (14.3%) were divorced, 39 (55.7%) were married, 4 (5.7%) were single, while 17 (24.3%) were widowed. The majority of married participants indicate that the participants enjoyed the emotional bonding provided by spouses.

Table 6. 16: Comparison of Age, Educational Level, and Marital Status Distribution

Age Group	Education				Marital Status			
	None	**Primary**	**secondary**	**tertiary**	**Divorced**	**Married**	**Singe**	**widowed**
20-29years	0	0	0	1	0	0	1	0
30-39years	0	2	3	0	0	5	0	0
40-49years	1	19	4	0	5	13	2	4
50-59years	5	15	8	0	2	17	1	8
60-69years	0	7	4	1	3	4	0	5

Table 6.16 above further cataloged the pre-test of the participants in relation to the age, educational level, and marital level distribution. From the distribution, it was revealed that majority of the participants from age 40-59 years had acquired basic primary education and were married as well.

Table 6. 17: Cronbach Alpha

	PRE-INTERVENTION	**POST-INTERVENTION**
DOMAIN	**CRONBACH ALPHA**	**CRONBACH ALPHA**
PHYSICAL HEALTH	0.6	0.5
PSYCHOLOGICAL	0.5	0.5
SOCIAL	0.5	0.3
ENVIRONMENTAL	0.6	0.6
ALL DOMAINS	0.8	0.7

Table 6.17 above depicts that the Cronbach alpha statistical test results for the WHOQOL Bref (2005) tool are 0.8 and 0.7 respectively. This implies that the WHOQOL Bref 26 (2005) item tool had an acceptable internal consistency.

Table 6. 18: Descriptive Analysis of the QOL Domains (Pre and Post-Intervention)

	PRE-INTERVENTION				POST-INTERVENTION			
Variable	**Minimum**	**Mean**	**Maximum**	**Standard deviation**	**Minimum**	**Mean**	**Maximum**	**Standard deviation**
Age	28	51	65	8.3	28	51	65	8.3
Global Quality of Life	2	3.6	5.0	0.7	3.0	4.2	5.0	0.6
Health Related Quality	2	3.4	5.0	0.8	3.0	4.3	5.0	0.6
Physical Health	35.7	64.6	85.7	11.8	46.4	75.9	89.3	8.3
Psychological Health	41.7	62.8	91.7	11.3	58.3	77.7	95.8	8.4
Social Relationship	25.0	53.0	91.7	15.1	33.3	64.5	91.7	12.7
Environmental Health	34.4	60.5	84.4	10.5	50.0	72.0	93.8	8.7

Table 6.18, presents the descriptive analysis of participants' pre and post-intervention ages and the QOL domains.

The results depict that the minimum and maximum age was 28years and 69years respectfully with a mean of 51 and a standard deviation of 8.3. Again, the mean age fell within the 50-59year group. The mean score for all the QOL domains increased after the MetS intervention. This is represented in the boxplot below.

Table 6. 19: Correlational Coefficiency Description of the QOL Domains

QOL DOMAINS	PRE-INTERVENTION		POST-INTERVENTION	
	Correlational Co-efficiency	**P-Value**	**Correlational Co-efficiency**	**P-Value**
Physical Health & Psychological Health	0.5	9.982 e-07	0.3	0.008
Physical Health & Social Relationship	0.3	0.013	0.2	0.07
Physical Health & Environmental Health	0.4	0.0006579	0.2	0.1
Psychological Health & Social Relationship	0.3	0.006843	0.3	0.03
Psychological Health & Environmental Health	0.6	9.048 e-07	0.5	1.555 e-05
Social Relationship & Environmental Health	0.4	0.001242	0.3	0.008

Table 6.19 above presented the **Correlational co-efficiency and P-value of the following quality of life domains in terms of Physical Health, Psychological Health, Social Relationship, and Environmental Health.** The results indicate that before the MetS intervention, there was no significant difference between Physical Health and Psychological Health of participants as well as between Psychological Health & Environmental Health since the p-values were 9.982 e-07 and 9.048 e-07 respectively.

There were however statistically significant relationships between Physical Health & Social Relationship, Physical Health & Environmental Health, Psychological Health & Social Relationship as well as Social Relationship & Environmental Health since all the p-values were less than 0.05.

Analysis of the results in Table 6.19, after the intervention revealed that there was significant difference between Physical Health and Psychological Health, Psychological Health and Social Relationship and Social Relationship & Environmental Health. This is because the P-values were all less than 0.05. However, there was no significant difference

between Physical Health and Social relationship, between Physical Health & Environmental Health as well as Psychological Health & Environmental Health since the p-values were all greater than 0.05.

Table 6.20 and 6.21 below gives the analysis of the pre and post intervention results on the quality of life scores of the participants with regards to the physical, psychological, social and environmental domains. There was massive improvement in all domains of QOL for the participants after the intervention.

A comparison of the results of participants' quality of life before and after the intervention are presented below:

Table 6. 20 : Frequency Responses (%) for Facets of the WHOQOL-BREF (n=70)
PRE-INTERVENTION

	Very Poor	**Poor**	**Neither**	**Good**	**Very good**
	1	2	3	4	5
1) General QOL		5(7.1)	24(34.3)	4(5.7)	3(4.3)
2) General Health		10(14.3)	24(34.3)	38(54.3)	5(7.1)
Physical Health Domain					
3) Pain and discomfort	1(1.4)	9(12.9)	18(25.7)	27(38.6)	15(21.4)
4) Dependence on medication	1(1.4)	20(28.6)	29(41.4)	17(24.3)	3(4.3)
10) Energy and fatigue		4(5.7)	21(30.0)	37(52.9)	8(11.4)
15) Mobility		4(5.7)	20(28.6)	40(57.1)	6(8.6)
16) Sleep and rest		11(15.7)	15(21.4)	37(52.9)	7(10.0)
17) Activities of daily living		6(8.6)	20(28.6)	32(45.7)	12(17.1)
18) Working capacity		3(4.3)	20(28.6)	38(54.3)	9(12.9)
Psychological Domain					
5) Enjoy life		16(22.9)	33(47.1)	19(27.1)	2(2.9)
6) Life meaningful		3(4.3)	3(4.3)	26(37.1)	6(8.6)
7) Memory and concentration	1(1.4)	8(11.4)	15(21.4)	37(52.9)	9(12.9)
19) Self –esteem		5(7.1)	22(31.4)	33(47.1)	10(14.3)
11) Body image	1(1.4)	12(17.1)	27(38.6)	22(31.4)	8(11.4)
26) Negative feelings		6(8.6)	14(20.0)	40(57.1)	10(14.3)
Social Domain					
20) Personal relations		11(15.7)	29(41.4)	20(28.6)	10(14.3)
21) Sex	2(2.9)	21(30.0)	30(42.9)	13(18.6)	4(5.7)
22) Practical social support		20(28.6)	30(42.9)	20(28.6)	
Environmental domain					
8) Physical safety and security	1(1.4)	3(4.3)	33(47.1)	29(41.4)	4(5.7)
• 9) Health of environment		6(8.6)	25(35.7)	30(42.9)	9(12.9)
12) Financial resources		21(30.0)	29(41.4)	17(24.3)	3(4.3)
13) Information and skills		13(18.6)	36(51.4)	20(28.6)	1(1.4)
14) Recreation and leisure		21(30.0)	29(41.4)	17(24.3)	3(4.3)
23) Living conditions	1(1.4)	7(10.0)	15(21.4)	38(54.3)	9(12.9)
24) Access to health care		2(2.9)	26(37.1)	30(42.9)	12(17.1)
25) Transport		6(8.6)	32(45.7)	29(41.4)	3(4.3)

Table 6. 21: Frequency Responses (%) for Facets of the WHOQOL-BREF (n=70) POST-INTERVENTION

	Very Poor	**Poor**	**Neither**	**Good**	**Very good**
QOL DOMAINS	1	2	3	4	5
1) General QOL			6(8.6)	44(62.9)	20(28.6)
2) General Health			7(10.0)	35(50)	28(40.0)
Physical Health Domain					
3) Pain and discomfort		5(7.1)	5(7.1)	39(55.7)	21(30.0)
4) Dependence on medication	1(1.4)	7(10.0)	35(50.0)	25(35.7)	2(2.9)
10) Energy and fatigue			10(14.3)	38(54.3)	24(34.3)
15) Mobility			8(11.4)	47(67.1)	15(21.4)
16) Sleep and rest		1(1.4)	46(65.7)	46(65.7)	18(25.7)
17) Activities of daily living			8(11.4)	34(48.6)	28(40.0)
18) Working capacity			8(11.4)	46(65.7)	16(22.9)
Psychological Domain					
5) Enjoy life			17(24.3)	40(57.1)	13(18.6)
6) Life meaningful			9(12.9)	42(60.0)	19(27.1)
7)Memory and concentration			1(1.4)	36(51.4)	33(47.1)
19) Self –esteem			23(32.9)	34(48.6)	13(18.6)
11) Body image		1(1.4)	21(30.0)	39(55.7)	9(12.9)
26) Negative feelings			1(1.4)	37(52.9	32(45.7)
Social Domain					
20) Personal relations		2(2.9)	24(34.3)	27(38.6)	17(24.3)
21) Sex	1(1.4)	7(10.0)	35(50.0)	19(27.1)	8(11.4)
22) Practical social support		4(5.7)	27(38.6)	37(52.9)	2(2.9)
Environmental domain					
8) Physical safety and security			11(15.7)	46(65.7)	13(18.6)
9) Health of environment			10(14.3)	38(54.3)	22(31.4)
12) Financial resources		2(2.9)	29(41.4)	32(45.7)	7(10.0)
13) Information and skills		4(5.7)	35(50.0)	29(41.4)	2(2.9)
14) Recreation and leisure		2(2.9)	27(38.6)	32(45.7)	9(12.9)
23) Living conditions			7(10.0)	37(52.9)	26(37.1)
24) Access to health care			13(18.6)	36(51.4)	21(30.0)
25) Transport			23(32.9)	44(62.9)	3(4.3)

ANOVA

Table 6.22 and 6.23 below describes a comparison of the pre and post-intervention results of participants' QOL domains, their demographic characteristics and MetS indicators using ANOVA.

Table 6. 22: Comparison of QOL Domains, Age, Education, Marital Status, BP and BMI

DOMAINS	AGE GROUP		EDUCATIONAL QUALIFICATION		MARITAL STATUS		BMI		BP	
	F-Value	P-Value	F-Value	P-Value	F-Value	P-Value	F-Value	P-Value	F-Value	P-Value
Physical Health	2.89	0.03	1.11	0.35	0.09	0.965	0.02	0.9	0.4	0.7
Psychological Health	1.12	0.36	1.76	0.16	0.515	0.673	0.04	0.8	0.3	0.7
Social Relationship	1.98	0.11	1.41	0.247	0.235	0.853	0.07	0.8	0.4	0.7
Environmental Health	0.36	0.83	5.867	0.0013	0.33	0.804	0.2	0.6	0.08	0.9

ANOVA (Post Intervention)

Table 6. 23: Age, Marital Status, Educational Status and QOL Domains

QOL DOMAINS	Age Group		Education		Marital Status		BP	
	T-Value	P-Value	T-Value	P-Value	T-Value	P-Value	T-Value	F-Value
Physical Health	1.24	0.30	0.5	0.7	0.1	0.9	0.9	0.4
Psychological Health	0.95	0.44	2.3	0.09	1.2	0.3	1.0	0.4
Social Responsibility	1.26	0.29	1.0	0.4	0.7	0.5	0.5	0.6
Environmental Health	0.012	0.99	4.5	0.0065	0.3	0.8	0.4	0.7

Table 6.23 indicates that before the intervention, psychological, social and environmental domains were not different for the various age groups, however there was significant difference in physical health score for the various age groups.

For those with different marital statuses, there was no significant difference in the various QOL domains. They all had similar scores for all the four domains since the p-value was greater than 0.5.

For educational background, participants with different educational background had similar scores for the physical, social and psychological domains, however, they looked at environmental health differently. Thus, there was significant difference between educational background and environmental health since the p-value was less than 0.5.

For BP, and BMI, there was no significant difference in all the four QOL domains for those with high, normal and low BP as well as for those who were obese, overweight and those who had normal BMI since the p-values were greater than 0.5.

The post intervention results captured on Table 6.23 indicate that Physical, Psychological, social and environmental domains were not different for the various age groups, and those with different marital statuses, thus there was no significant difference, participants of

different age groups and those with different marital statuses had similar scores for all the four domains since the p-values were greater than 0.05.

For educational background, participants with different educational background had similar scores for the physical, social and psychological domains, however, they looked at environmental health differently. Thus, there was significant difference between educational background and environmental health since the p-value was less than 0.05.

For BP, there was no significant difference in all the four domains for those with high, normal and low BP since the p-value was greater than 0.05.

WELCH T-TEST QUALITY OF LIFE AND METS INDICATORS

This section describes a comparison of the pre and –post intervention QOL domains and MetS indicators using the Welch t-test**.**

Table 6. 24: FBS

	Pre-intervention				**Post-intervention**			
Domains	**High**	**Normal**	**T-Value**	**P-Value**	**High**	**Normal**	**T-Value**	**P-Value**
Physical Health	63.1	64.8	-0.4	0.7	78.6	74.5	2.4	0.02
Psychological Health	63.2	62.8	0.1	0.9	31.3	75.8	2.7	0.008
Social Health	56.9	52.6	1.1	0.3	67.7	62.9	1.5	0.1
Environmental Health	58.9	60.6	-0.4	0.7	75.0	70.4	2.1	0.04

Table 6.24 demonstrated that there was no factually significant contrast in the physical, psychological, social as well as environmental health scores for participants with high and normal FBS.

They all had similar scores for the various QOL domains before the intervention.

The results further revealed that after the intervention, there was no important change in the score for social relationship for participants with high and normal FBS. However, there was significant difference in the physical, psychological and environmental health scores for participants with high and normal FBS.

Table 6. 25: HDL

Domains	Abnormal	Normal	T-Value	P-Value	Abnormal	Normal	T-Value	P-Value
Physical Health	63.5	68.1	-1.6	0.1	77.4	75.6	0.8	0.4
Psychological Health	62.3	64.4	-0.7	0.5	77.1	77.8	-0.2	0.8
Social Health	52.2	55.1	-0.7	0.5	64.6	64.5	0.02	0.9
Environmental Health	59.8	62.3	-0.8	0.4	74.5	71.4	1.2	0.2

The results again revealed that no significant difference existed in the physical, psychological, social and environmental health scores for participants with low and normal HDL.

Again, after the intervention, no significant difference existed in the physical health, psychological health, social relationships and environmental health scores for those with low and normal HDL. All participants had similar scores for the various QOL domains.

Table 6. 26: TRIG

Domains	Abnormal	Normal	T-Value	P-Value
Physical Health	63.1	64.8	-0.4	0.7
Psychological Health	63.2	62.8	0.1	0.9
Social Health	56.9	52.6	1.1	0.3
Environmental Health	58.9	60.6	-0.4	0.7

The results further revealed that no significant difference existed in the physical, psychological, social and environmental health scores for participants with high and normal TRIG.

COMPARISON OF THE PRE AND POST INTERVENTION RESULTS OF THE QOL DOMAINS (n=70)

Table 6.27 below describes a summary of the comparisons of pre and post-intervention results of the MetS indicators and QOL domains using the Paired t test and Tukey test.

Table 6. 27: PAIRED- T TEST: Evaluation of QOL and MetS determinants

	Mean deviation	**95% Confidence Interval of Difference**		**t-test**	**p-value**
		Lower	**Upper**		
Physical Health	11.28	8.62	13.94	8.46	0.000
Psychological Health	14.92	12.25	17.58	11.16	0.000
Social Relationship	11.55	8.46	14.64	7.46	0.000
Environmental health	11.52	9.26	13.78	10.16	0.000
Systolic blood pressure	12.86	8.37	17.34	5.72	0.000
Diastolic blood pressure	6.00	3.21	8.79	4.28	0.000
Fasting blood sugar	0.81	0.28	1.33	3.05	0.003
Triglyceride	0.13	0.05	0.22	3.16	0.002
Body Mass Index	1.92	1.41	2.43	7.56	0.000
Waist Circumference	2.27	1.85	2.70	10.65	0.000
Knowledge	30.6	25.9	35.3	13.1	0.000

PAIRED T TEST FOR COMPARISONS OF THE MEANS OF THE QOL DOMAINS

PRE AND POST INTERVENTION

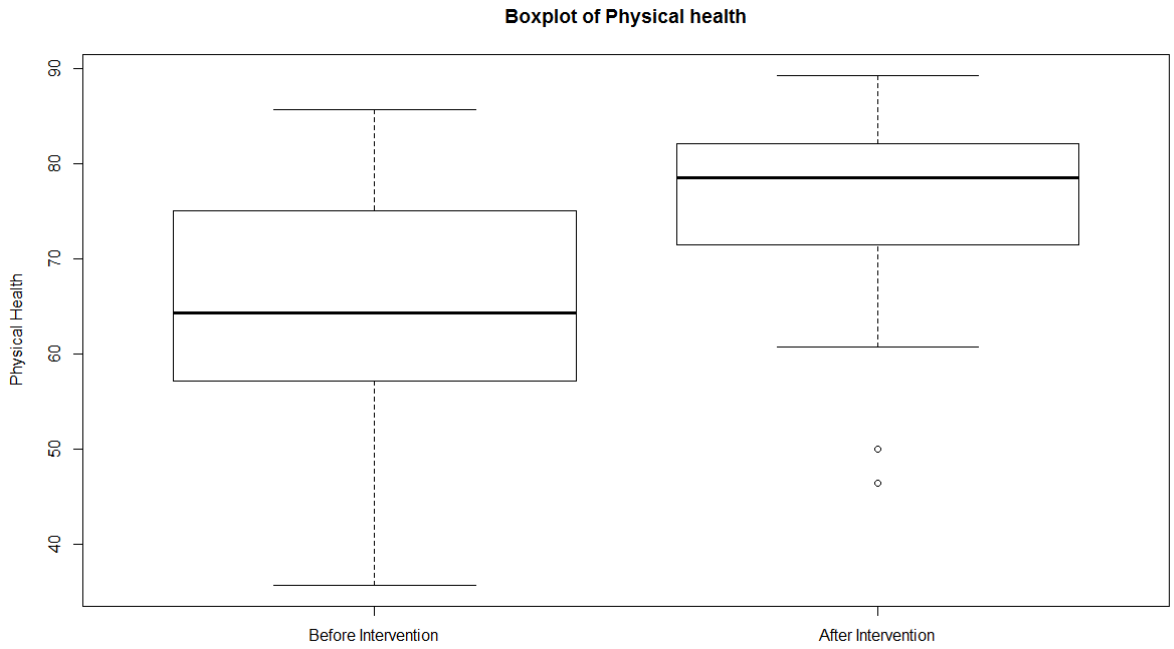

Figure 6. 20: Boxplot of Physical Health

From the Figure 6.28 outlined above, it is clear that there was an alteration in the physical health of the research populace after the intervention. The mean physical health after the intervention is much bigger than before the intervention.

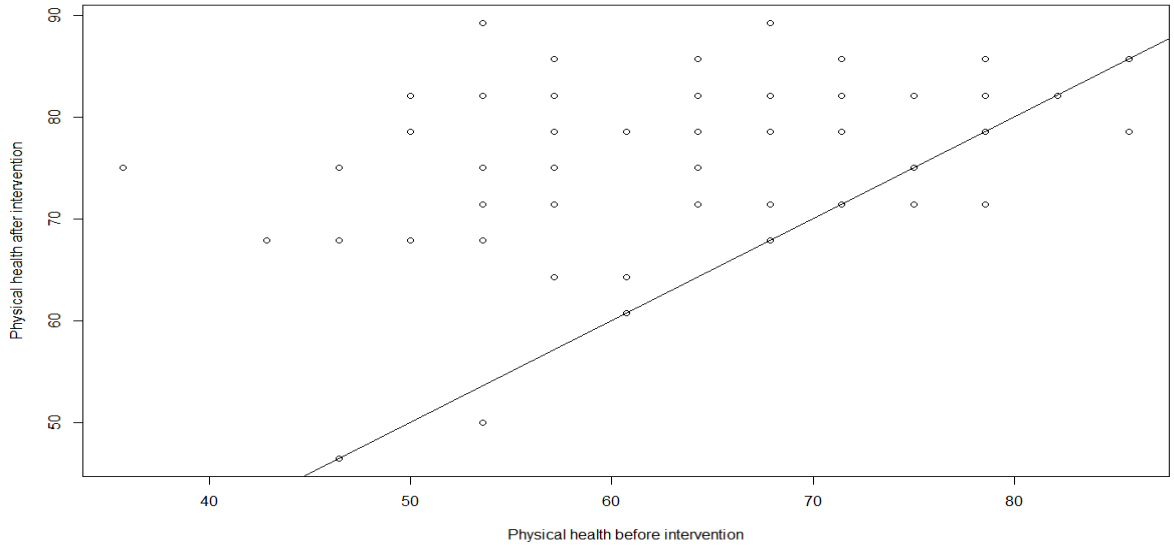

Figure 6. 21: Scatter Plot of the Physical Health

From the graph above, it is shown that for the physical health before and after intervention, much of the focuses lie above the 45-degree mark line which is suggests that there was an increase in the physical health after the participant went through the intervention program. The test statistics, t=8.46 and the p-value indicate is 0.000. The average physical health for participants before and after intervention is 64.64 and 75.92, respectively. The mean difference between the physical health before intervention and physical health after intervention is 11.28 which is an indication that the average physical health after intervention is higher. Since the p-value is significant, we conclude that there was a statistically significant improvement in the physical health of the participants after the intervention programme.

From the confidence interval, we are 95% sure that the mean contrast in physical wellbeing before and after intervention is somewhere in the range of 8.61 and 13.94. In view of this 95% certainty interval, we can infer that there is a statistically huge distinction in physical wellbeing after the intervention program since the confidence interval for the mean contrast does exclude zero.

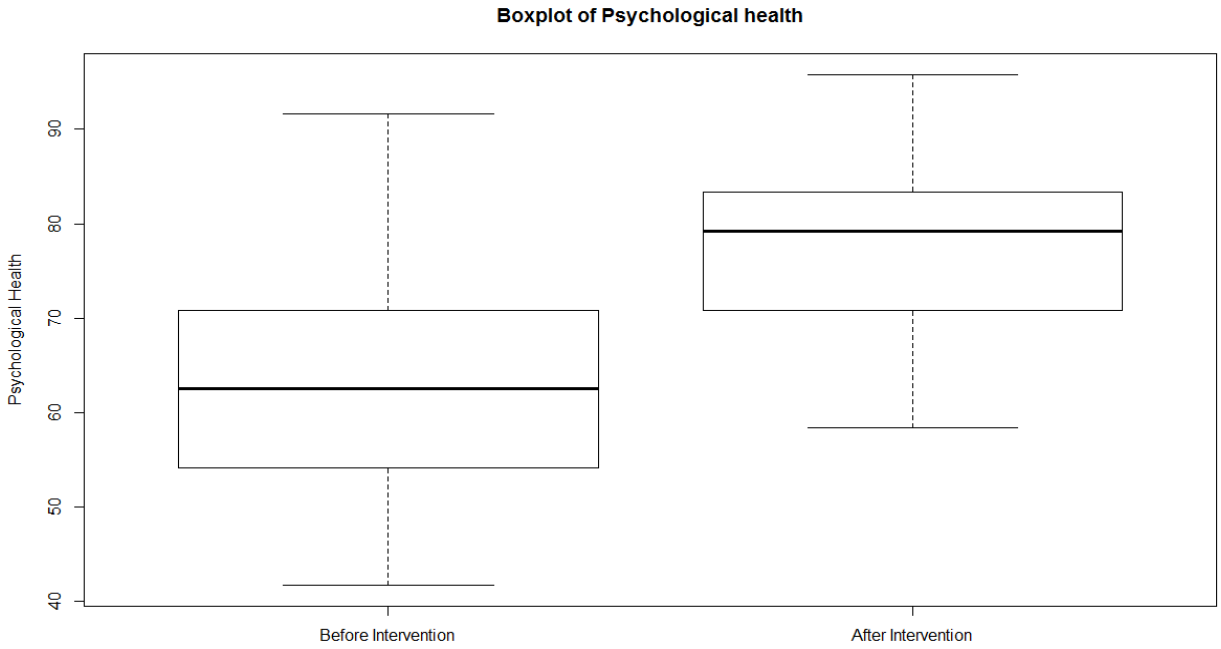

Figure 6. 22: Boxplot of Psychological Health

From the Figure 6.30 outlined above, it is evident that there was an adjustment in the psychological health of the participants after the intervention. The mean psychological health after the intervention is much bigger than before the intervention.

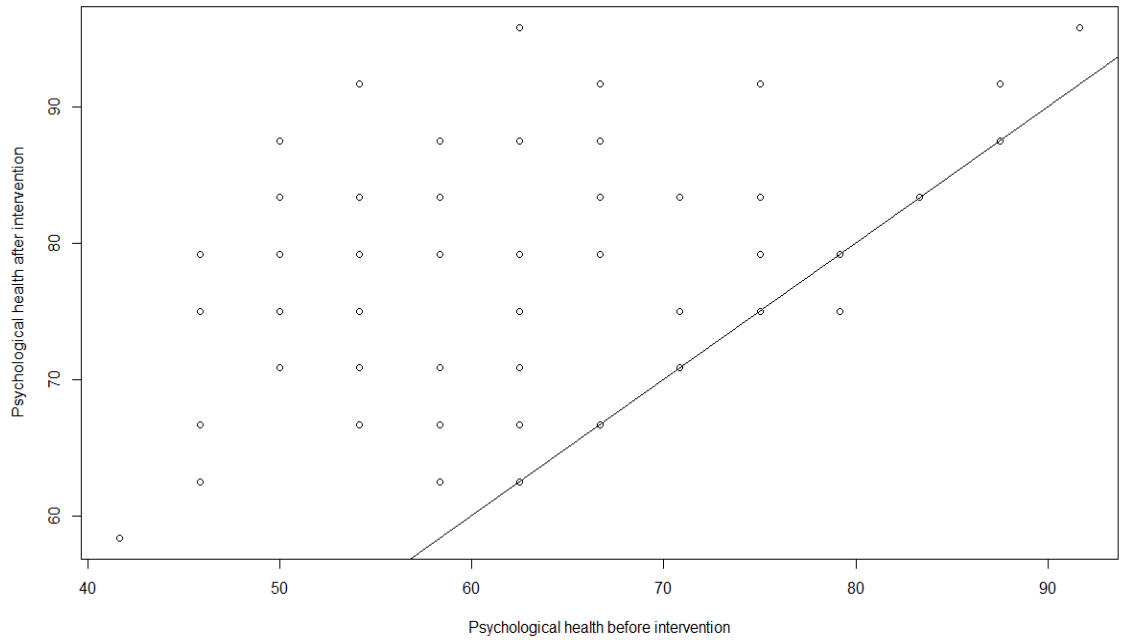

Figure 6. 23: Scatter Plot of the Psychological Health

Figure 6.31 above shows the results for psychological health before and after the intervention. It was revealed that most of the focuses lie over the 45-degree mark line, which suggested that there was an increase in the psychological health after the intervention, was administered to the participants.

The test statistics, t=11.16 and the p-value is 0.000. The average psychological health for participants' pre and post intervention is within the ranges 62.80 and 77.68, respectively. The average difference between the psychological health before intervention and physical wellbeing after intervention is 14.92 which is suggestive that the average psychological health after treatment is higher. Since there is a significant p-value, we can suggest that there was a statistically significant improvement in the psychological health of the research populace after the intervention programme.

From the indicative confidence interval value, we are 95% certain that the mean distinction in psychological wellbeing before and after intervention is within the range of 12.25 and 17.58. Based on this 95% confidence interval, we can infer that there is a statistically significant change in psychological health after the intervention programme, since the confidence interval for the mean difference does not include zero.

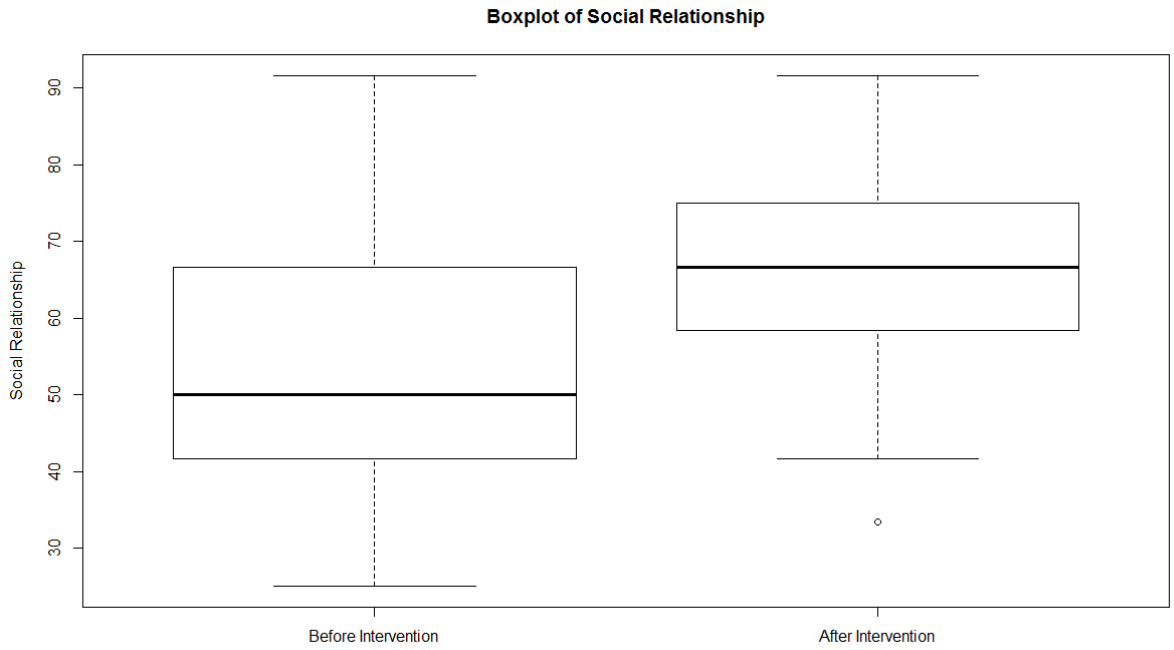

Figure 6. 24: Boxplot of Social Relationship

From the Figure 6.32 above, it is obvious that there was an alteration in the social responsibility of the participants after the intervention. The mean social responsibility post intervention is much bigger than before the intervention.

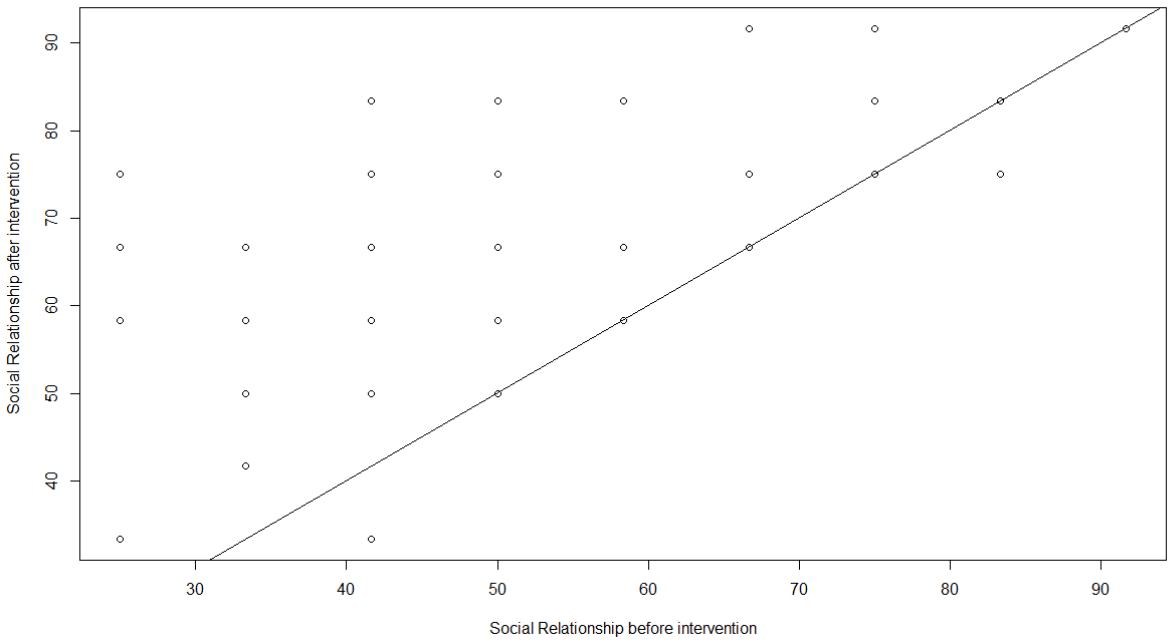

Figure 6. 25 : Scatter Plot of the Social Responsibility

From the Figure 6.33 of the social responsibility prior to and post treatment, many of the plotted dots were located over the 45degree mark-line which implies that there was an increase in the social responsibility after the intervention administered to participants.

The test statistics, t=7.46 and the p-value also is 0.000. The mean social relationship for participants before and after intervention is 52.98 and 64.52, respectively. The average difference between the social relationship before intervention and physical health after intervention is 11.55 which mean that the average social relationship after treatment is higher. Since there is a significant p-value, we end that there was a huge significant improvement in the social relationship of the participants after the intervention programme. using 0.05 as the alpha value, we are we are 95% certain that the average distinction with social relationship pre and post intervention ranges between 8.46 and 14.64. It could be concluded that there is distinction in social relationship after the intervention programme since the confidence interval for the mean difference does not include zero.

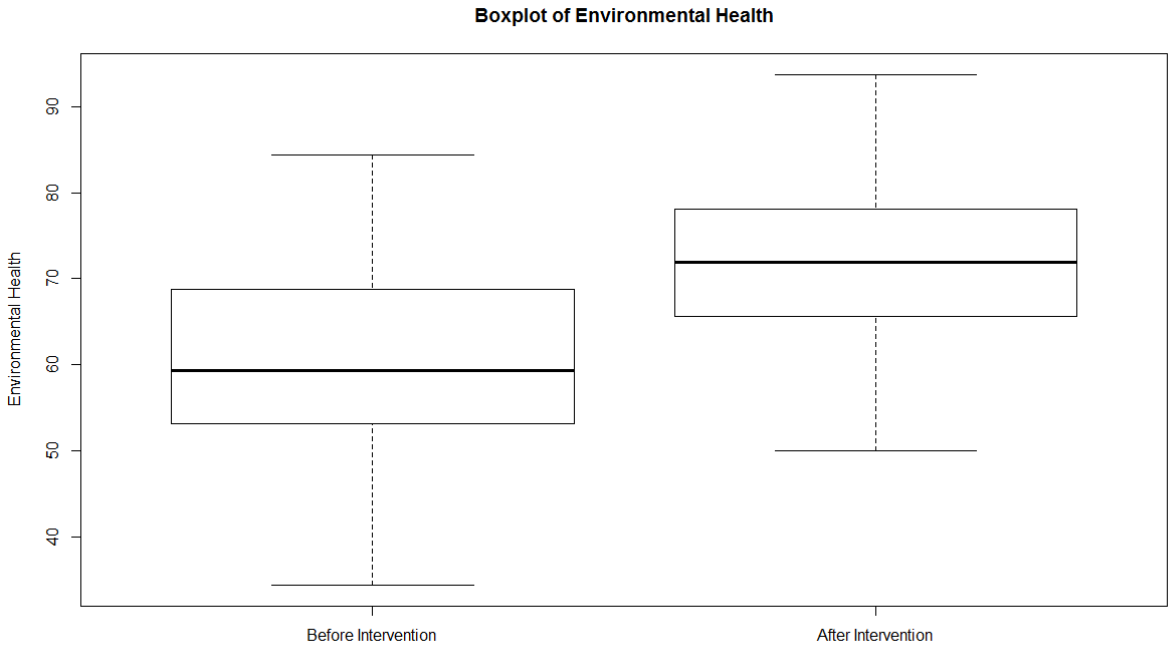

Figure 6. 26: Boxplot of Environmental Health

From the Figure 6.34 above, it is revealed that there was a change in the environmental health of the research members after the intervention. The mean environmental health after the intervention is much bigger than before the intervention.

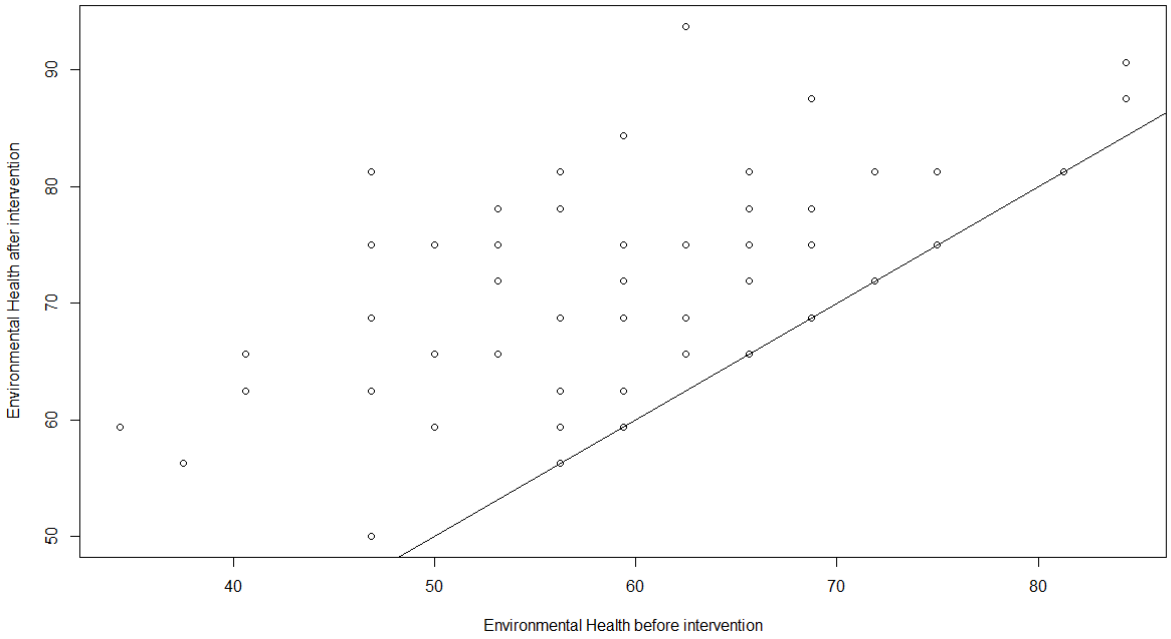

Figure 6. 27 : Scatter Plot of the Environmental Health

From the Figure 6.35 outlined above, of the environmental health prior to and after treatment, many of the plotted dots were located over the 45degree mark-line which implies that there was an upward increase in the environmental health after the intervention was administered to the participants.

The test statistics, t=10.16 and the p-value is 0.000. The mean environmental health for participant's pre and post intervention is 60.45 and 71.96, respectively. The average difference between the environmental health before intervention and physical health after intervention is 11.52 which suggest that the average environmental health after intervention is higher. With a significant p-value, we can infer that there was an appreciation in the environmental health of the respondents after the intervention programme.

From the confidence interval value, we are 95% sure that the mean difference in environmental health pre and post intervention ranges between 9.26 and 13.78. In observing 95% confidence interval, we can aver that there is a statistically important difference in environmental health after the intervention programme since the confidence interval for the mean difference excludes zero.

Analysis of the current study gain indicated that the mean physical health for participants before and after intervention were 64.64 and 75.92, respectively. For psychological health for participants, the mean before and after intervention is 62.80 and 77.68, respectively. Again, the mean social relationship for participants before and after intervention was 52.98 and 64.52, respectively. Finally, the mean environmental health for participants before and after intervention was 60.45 and 71.96, respectively. It was therefore concluded that there was improvement in all domains of QOL among participants after the intervention programme.

The above findings are similar to Saboya et al., (2016)'s study which brought to fore that at 3 months, there was positive advancement in the QOL, although it was to a larger extend, linked to the physical functioning domain. The researchers again averred that poor quality of life brought about persistent anxiety and depression although they participants did not show any response with the intervention.

Unlike Manner, Johangiry (2017) also indicated that with respect to Health-Related Quality of Life (HRQOL), there was a great improvement in the general well-being of the participants in the intervention. In the same vein, Borkoles et al., (2016) also revealed in their study that with the aspect of their lifestyles, the intervention group did so well than the control group. Sakulsupsiri et al (2016) also posited that, Self- Management Programme (SMP) helped to reduce socio-economic burden and other complications of the patients with MetS. Comparison of the current study with other studies revealed that the researchers were more interested in participants' physical health and psychological well-being. Unlike the current study, none of these studies looked at participants' social relationships or well-being.

Section 6.5 described the results and discussion of the primary and secondary outcomes of the study. The next section describes a participants' satisfaction survey, as well as the researcher's evaluation of the intervention programme and the entire research**.**

CLINICAL SIGNIFICANCE OF THE PILOT STUDY FINDINGS

The findings from the pilot study indicate that MetS is a clinical challenge and requires a multifactorial and multidisciplinary approach. Changes in lifestyle which include both dietary modification and increased daily exercise are obviously the first therapeutic step in the treatment of MetS.

The pilot study revealed that all five clinical markers of MetS improved with therapeutic diet and physical activity. This implies that MetS is important to identify not only because of its associated risks, but also to emphasize that lifestyle should be the initial focus of therapy.

SECTION B

6.6: POST INTERVENTION: PARTICIPANTS SATISFACTION SURVEY

6.6.1 Introduction

A participant satisfaction survey was conducted after the MetS intervention aimed at assessing the opinions of the market women involved in the pilot study about the intervention programme and the entire research process as part of the programme evaluation. All the market women (n=70) who were involved in the pilot study, consented to take part again in the satisfactory survey.

6.6.2 Sample size and sampling procedure

A census (n=70) of all the market women who participated in the pilot study agreed to part take in the post intervention satisfaction survey.

A meeting was held with all the participants after the post intervention data collection which sought to re-assess the women's knowledge, prevalence and quality of life. They were again invited to participate in the satisfaction survey, and consent forms were signed to that effect.

6.6.3 Data Collection Instrument and Procedure

Neil and Heyliger (2001)'s Programme Satisfaction Assessment tool was used for data collection (Appendix 10). Permission to use the tool and modify it to suit the study and the Ghanaian context was also sought and obtained from the Authors.

A researcher administered questionnaire was used to obtain data on participants' satisfaction of the intervention.

6.6.4 Data Analysis

The returned questionnaires were coded and entered into Microsoft excel spreadsheets and analyzed using the Statistical Package for Social Sciences (SPSS) version 22 in consultation with a statistician. Descriptive statistics were used to organize and present the data as indicated in Table 6.28.

6.6.5 Results:

Table 6. 28: Analysis of Satisfaction Evaluation Questionnaire (n=70)

	Strongly Agree n (%)	**Agree N (%)**	**Neither N (%)**	**Disagree N (%)**	**Strongly Disagree n (%)**
	1	**2**	**3**	**4**	**5**
Program met expected goals	42(60)	25(35.7)	3(4.3)	0(0)	0(0)
Concise presentation of interventions	64(91.4)	6(8.6)	0(0)	0(0)	0(0)
Appropriate activities	57(81.4)	9(12.9)	4(5.7)	0(0)	0(0)
Discussions applicable to goals	62(88.6)	8(11.4)	0(0)	0(0)	0(0)
Active engagement of participants	61(87.1)	9(12.9)	0(0)	0(0)	0(0)
Facilitated actions, behavior and goals.	50(71.4)	20(28.6)	0(0)	0(0)	0(0)
Accurate reflection of goals and objectives	55(78.6)	15(21.4)	0(0)	0(0)	0(0)
Researchers are knowledgeable	69(98.6)	1(1.4)	0(0)	0(0)	0(0)
Researchers covered everything	23(32.9)	29(41.4)	18(25.7)	0(0)	0(0)
Duration of program was appropriate	16(22.9)	17(24.3)	21(30)	14(20)	2(2.9)
Program too short	24(34.3)	26(37.1)	8(11.4)	9(12.9)	3(4.3)
Enlightenment on metabolic syndrome and QOL	34(48.6)	34(48.6)	2(2.8)	0(0)	0(0)

Ten question were asked to assess participant's satisfaction with the MetS intervention programme.

With regards to whether the program met the expected goals, the results of the study brought into light that a majority of 67(95.7%) agreed to the question asked that the program met expected goals, while only 3(4.3%) were neutral. These results suggest that almost all the participants were happy and believed that the program did meet its expected outcomes, not only to the researchers but also to them as well.

The second aspect in the questionnaire sought to enquire about participants' perceptions of how the intervention was implemented. The results showed that all 70(100%) participants agreed to the fact the program presented its intervention in a concise way.

In response to appropriateness of the activities, none of the participants expressed that the activities were inappropriate. The results showed that a minority 4(5.7%) remained indifferent to the question while the majority 66(94.3%) "agreed''.

Five questions were asked enquiring about participants' satisfaction with the following aspects of the intervention: "discussions applicable to goals"; "active engagement of participants"; "facilitated actions, behavior and goals"; "accurate reflection of goals and objectives" and "researchers are knowledgeable". It is interesting to note from the results that all the participants 70(100%) responses ranged between "strongly agreed and "agreed" and none were dissatisfied.

The responses to the last four questions showed that firstly, except for the 18(25.7%) that was neutral, the majority group of 52 participants representing 74.3% felt that everything was addressed in the intervention programme.

Secondly, out of 70 participants, 33(47.2%) agreed that the duration of the program was appropriate and hence they were satisfied. A significant minority 23% (n=16) of the participants stated dissatisfaction with the duration of the programme while 21(30%) were indecisive as to whether they agreed or disagreed.

Furthermore, the results revealed that a majority of 50(71.4%) participants reported that the program was too short and hence suggested it had to be extended. Only 8(11.4%) were neutral hence chose neither as response. While the remaining 12(17.2%) were of the view that the duration for the programme was appropriate.

Last but not the least, the study found it necessary to investigate from the participants if they have been enlightened about metabolic syndrome after actively participating. The results documented in the table above depict that, a significant majority of 68(97.2%) agreed to this question. Only 2(2.8%) participants out of 70 remained neutral, with no participant disagreeing.

6.6.5 Discussion and Summary of Results of the Participants' Satisfaction Survey

The results presented in the table above depicted that the participants affirmed that they were satisfied with the program as evidenced by most of them reporting strongly agreed or agreed to almost all the positive questions asked. They were however of the view that the duration of the programme was short. This results is similar to Smailes et al.,(2016) who also found out that their participants' experience at the authors' institution was largely satisfactory when analyzed collectively for all groups. They however averred that despite the overall satisfaction reported by the study participants, a small minority of them were unhappy with their trial experience. Furthermore, adult females were found to be more likely than males to provide open-ended feedback in the survey. Similarly, in another recent survey, Prevatt et al., (2018) also reported that there was a high satisfaction among the participants with great positive perceptions of the program.

6.7 RESEARCHER'S EVALUATION OF THE ENTIRE PROGRAMME

In this section, the researcher's evaluation of the entire programme and research process is described. Evaluation in this study focused on assessing the extent to which the programme objectives were met.

According to Rossi et al., (2004), cited in Blantari et al., (2005) depending on the purpose of the study, its evaluation may take different forms In this study, The Centers for Disease control and prevention (CDC, 2014) criteria for evaluation which include: process evaluation, impact assessment and outcome evaluation were employed in assessing the success of the entire programme.

6.7.1 Process Evaluation:

This aspect evaluates every step in the study to ascertain how best it is meeting its set objective. A research proposal was developed which captured the plan for

implementing the programme and a Mets intervention programme was developed and pilot tested among market women identified to have MetS as stipulated in the proposal.

6.7.2 Impact Assessment

This determines whether the programme has brought about a change.

In this study, impact assessment was done to assess whether the MetS intervention programme achieved its purpose of improving market women's knowledge on MetS, dropping the prevalence of MetS, and improving the quality of life of those with and at risk of MetS. According to CDC (2014), the criteria for impact assessment include the following:

- Determining the Framework for evaluation
- Defining the target population
- Assessing the place and time
- Assessing the instrument for data collection and analysis and observing consistencies
- Assessing the intervention
- Writing evaluation report

In the current study, the researcher applied the following in evaluating the MetS evaluation and the entire research process:

- T**he target population**: The population for the study comprised market women trading at the Kaneshie Market. This population was very appropriate for this study due to the fact that market women in Ghana by virtue of the nature of their work are prone to non-communicable diseases. They are physically inactive, do not have time to exercise and tend to buy and eat any food available on the market. These market related factors coupled with the lack of knowledge on MetS, predispose the women to metabolic syndrome. This study results had it that over 70% of these women were either at risk or had MetS. This therefore justifies the researcher's decision of targeting market women.

- **Research Setting:** The study was conducted at a market place. In Ghana market places are very busy places and densely populated with a lot activity. -The choice of a market place for the study was therefore very appropriate since both traders and customers benefited from the intervention, and the researchers were able to reach out to and educate a lot of People in order to promote health.
- **Research Methodology:** The methodology adopted for this study made appropriate use of employing a mixed method of collecting data qualitatively and quantitatively. This helped in gathering the right information from the participants.
- **Recruitment and Training of field workers or research assistants**
  Newly qualified graduate nurses who have obtained training and certified to do anthropometric and physiologic measurements, were employed as field workers or research assistants. They were however trained again by a senior researcher on the administration of the data collection tools, the use of the anthropometric and physiologic measurement instruments as well as the performance of a proper anthropometric and physiologic measurements. The research assistants were very hardworking, punctual and up to task and contributed immensely towards the success of the entire programme.
- **Validity and Reliability of data collection instruments and study results**
  Pre-validated or calibrated equipment (standardized instruments) were used and procedures such as blood pressure measurement were done professionally. This helped in obtaining accurate results. Pre-testing of the instruments was done to ensure inter rater reliability. Experienced laboratory technicians were employed to take samples and do the lipid profile of participants hence accurate results were achieved.
  Cronbach Alpha statistical tests of the K-MS Knowledge of MetS tool and the WHOQOL BREF 26 quality of life tool were done to ensure validity, and these tools were very instrumental in obtaining authentic results.

- **The MetS intervention Programme:** The health promotion programme was reviewed by experts and appropriate corrections effected as suggested

by the experts. The programme was also very colorful and attractive, therefore the participants were very attracted by it and some handled the booklet with caution to avoid any blemish.

The eating plan and exercise programmes designed was well embraced by the market women since they found it very feasible and suitable. The food types, vegetables and fruits were considered by the women as very common on the Ghanaian market and very affordable. The day and time for the weekly weight monitoring was discussed, and chosen in consultation with the participants hence they were very punctual.

- **Participants:** The market women were very cooperative, dedicated and enthusiastic about the study. This is because they saw it as ‘’health care at their door step’ ’and an opportunity for improving their health status. They therefore willingly embraced the programme and participated fully without any coercion or application of force. Women who had to attend other programmes, made sure they pass thru the market to partake in the weekly aerobic exercises and weight checking before going for any other programme. Some of them volunteered to encourage their colleagues, and urged them on. Others also became ambassadors of MetS, educating colleague market women who were not part of the study on healthy living and the MetS intervention programme.
- **Market Authorities**

  The authorities of the Kaneshie market were very supportive, tolerant and supportive. They willingly gave out the health room anytime a request is made for its use without any financial demands. The market queen assisted and directed the research team to locate stall numbers of the market women for floors that were congested. The staff of the market administration also embraced the programme and some of them joined in the weekly weight checking and health screenings to know their health status.

Table 6. 29: Descriptive Analysis of Results of Weekly Weight Monitoring

	Minimum	Mean	Mode	Median	Maximum	S.D
	0	4.1	2	3	25	4.06

The table above depicts the descriptive analysis of Results of the Weekly weight monitoring for the market women involved in the study.

From the results, the minimum weight loss was 0%. 4(5.7%) participants maintained their body weights throughout the entire programme. They did not lose weight or gain additional weight. The remaining 66(94.3%) participants all lost a considerable amount of weight. The mean weight lost was 4.1kg. This implies that the MetS intervention programme made remarkable improvements in the lives of the participants.

6.7.3 Outcome Evaluation

To evaluate the overall success of the entire programme, the following measures were employed:

Anthropometric and physiologic measurements to re-evaluate prevalence of MetS, as well as re-assessment of participants' knowledge of Mets and quality of life were conducted. Researcher's observations and a review of field notes also helped in conducting an outcome evaluation of the entire programme, and the research process as a whole.

The results of the study indicated that after three-month exposure to the MetS intervention, the market women's knowledge on MetS improved from 37.1 % to 67.6%, there were also significant improvement in the women's MetS parameters. Their BMI, FBS, BP, Waist circumference and triglyceride levels reduced, while their HDL levels increased. The quality of life of the women also improved (refer details in section 8.3.5.3).

Two participants who were observed to have played an active role in the intervention programme and had lost a significant amount of body weight (25kg and 17 kg respectively), were given awards. All participants who were enrolled in the pilot study, were also given a T-shirt and apron each with the inscription

"Know your metabolic syndrome status'' to serve as ambassadors for MetS. They were commended for actively and voluntarily making time to time to participate in the study. The participants were informed that officially the pilot study had ended, however the researcher will embark on occasional unannounced visits to see how they were doing and monitor if they were still adhering to the intervention. The researcher submitted a written report and a letter of appreciation to the market queen and the market administration for granting permission and approval for the study to be conducted at the Kaneshie market.

Generally, the health promotion programme had a positive impact on the women as it positively resulted in lifestyle changes and made them very conscious about their health and well-being. Overall, the programme was very successful, and its main objective of refining the quality of life of market women identified to have MetS as well as improving health outcomes was achieved. The women were very enthusiastic about the programme, and wished the duration was extended. The results of the health screening were well packaged in the form of a report and distributed to all participants who were involved in all stages of the research and participants were very appreciative. Those who were scheduled for hospital visits indicated they were going to show it to their doctors. Others also stated they were going to keep it as their medical records.

6.8 SUMMARY

This chapter described the implementation and evaluation of the MetS intervention. The procedure for piloting the MetS intervention programme, and a MetS awareness day were outlined. The researcher's evaluation of the success or failure of the entire research process which entailed the methodology for evaluating the MetS intervention programme and the entire research process as well as a participants' satisfaction survey conducted to assess the opinions of the market women about the MetS intervention programme were described.

CHAPTER SEVEN

SUMMARY OF THE STUDY AND CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

7.1 INTRODUCTION AND SUMMARY OF THE STUDY

This chapter presents a summary of the entire study together with the conclusions drawn. The limitations encountered during the study have also been outlined and due recommendations suggested. The findings of the study were used to present its implications for nursing practice, education as well as policy and research.

This study sought to develop a MetS intervention programme aimed at promoting health and quality of life of market women at Kaneshie in Accra, Ghana. A multi-phased mixed method, one group pre and post-test intervention design was used in conducting this study.

In the context of this study, Pender (1996)'s health promotion model was used to guide the process of identifying key constructs related to health and improved outcomes. In addition, Onwuegbuzie and Teddlie's seven-staged mixed methods design was applied in phase 2 of the study to formulate the MetS intervention programme.

To attain the aim of the study, it was conducted in three phases that covered eight objectives.

Phase 1

Phase 1 was the Situational Analysis Phase which comprised five studies.

- Two quantitative surveys aimed at describing the knowledge of metabolic syndrome as well as anthropometric measurements to establish the prevalence rate among market women were conducted on a randomly selected sample of market women (n=348).
- A relationship was established among demographic characteristics of participants as well as their knowledge of MetS and MetS predictors.
- Following the two surveys, a quality of life survey was conducted on a purposively selected sample of market women (n=100) identified to have signs suggestive of metabolic syndrome to describe the women's perceptions of their quality of life.

- A relationship was also established among the QOL Domains and MetS predictors
- Exploring the market women's opinions regarding measures that could be implemented to improve health outcomes of women identified to have signs suggestive of Mets as well as those at risk of MetS was achieved through focus group interviews.
- The last research study in Phase 1 entailed searching for documented interventions or health promotion programmes for metabolic syndrome which were explored using research data bases such as PubMed and CINAHL.

Phase 2

Phase 2 comprised two processes. The first research process involved the development of a MetS intervention programme based on data triangulation of findings from the situational analysis in Phase 1 (Onwuegbuzie & Teddlie, 2003).

The intervention comprised exercise, diet and health education programmes intended at improving the health outcomes and quality of life of market women identified to have signs suggestive of metabolic syndrome as well as those at risk based on the situational analysis in Phase one.

In the second process, the developed health promotion programme was reviewed by a team of experts at University of Ghana, members of non-governmental organization involved in health promotion programmes, dietician, physical therapist, a medical practitioner as well as a market woman who was a participant.

Phase 3

Phase 3 was the pilot testing phase. This entailed testing of the MetS intervention programme among (n=70) market women identified to have MetS.

Primary outcome evaluation entailed anthropometric and physiologic measurement to establish the prevalence of Mets programme. Secondary outcomes of the intervention programme included participants' improved knowledge of MetS and their quality of life. A participants' satisfaction survey and researcher's evaluation of the success of the program were also conducted for the entire programme evaluation.

7.2 SUMMARY OF RESULTS

7.2.1 Introduction

7.2.1.1 Demographic Finding

The results generally suggest that the minimum age of participants was 25years, the maximum was 65 years, while the mean age was 46years. The population for the study was moderately a literate populace. This is because, about 88.2% of participants had received education up to primary level.

The results further revealed that participants involved in the study had worked for a maximum of 47 years and a minimum of 1 year with a mean year of 18.48 as market women. They were therefore experienced and typical Ghanaian market women who had been involved in trading activities for quite a number of years.

7.2.1.2 Knowledge of MetS

Analysis of the total knowledge score of participants in this study revealed that, only 68(19.5%) had adequate knowledge of MetS and therefore scored above 50% of the total knowledge score. A significant majority's level of knowledge was below 50%. The results further showed that the 50-59 recorded the highest knowledge of MetS score (43%), while the 60-69 years recorded the lowest knowledge score of 36%. The results reveal the importance of educating the older generation (60-69) with knowledge of MetS since it MetS was also common among this age group. Furthermore, a vast majority (87.4%) did not know the factors associated with MetS as well as the indicators and complications. Interestingly, a vast number of participants, 80.7% were able to answer correctly when asked about the preventive measures.

7.2.1.3 Prevalence of MetS

The data analysis revealed that 100(28.7%) out of the total sample of (n=348) tested positive for Metabolic Syndrome. This implies that participants had abdominal obesity plus two of the MetS indicators. Also, 48.3% were identified to be at risk for developing metabolic syndrome while 23% tested negative per the IDF criterion for metabolic syndrome. The analysis further revealed that the 50-59years age group recorded the peak value for positive participants 44(44%). Again, the results

indicated that 50% of participants were found to be obese with their BMI values exceeding 30kg/m2. The findings of this study also brought to fore that alarmingly, all (100%) the positive for MetS participants had abnormally high waist circumference (WC) or central obesity. High waist circumference (100%) (75%), low levels of high density lipoprotein (75%) and high blood pressure (75%) were the three most prevalent MetS indicators or predictors identified among the market women who tested positive for MetS. Fasting blood sugar (54%) was the fourth most prevalent indicator while only a few participants (8%) had high triglyceride levels, hence TGLS was the least indicator.

7.2.1.4 Quality of Life

The finding suggests that participants had an appreciable level of quality of life since most of them scored over 50% for all the QOL domains. However, some participants expressed that they often experience bodily pains, burn out, anxiety and depression and were therefore not satisfied with their quality of life.

From the results, the average physical, psychological, social and environmental domains before the intervention were as follows: 58.7, 61.3, 50.7, and 59.7 respectively, with participants scoring high in psychological health, which might probably be because the women enjoyed the trading activities and the bonding with each other since they had in-groups. This notwithstanding, they rated low in social health. They saw themselves as lacking social life due to their busy trading activities.

7.2.1.5 Market Women's Opinions about Measures that Promote Health.

Major themes identified in conducting the qualitative study include:

- Quality of life
- Need for change in lifestyle
- Barriers to lifestyle changes
- Lifestyle modification

7.2.1.6 Results of the Integrative Literature Review

In all, 97 Articles were reviewed, 64 were rejected and 27 Used. Twenty-six of these studies involved women.

Interventions were mainly on diet only, exercise therapy only and combined diet and exercise therapy. None of the interventions was done in Ghana, and one was done in Africa.

7.3 POST- INTERVENTION RESULTS

The minimum age of participants who enrolled in the pilot study (n=70) was 28, the maximum was 65, and the mean age was 51. The prevalence of MetS was again found to be high among women aged 50-59 years.

7.3.1 Knowledge of MetS

The results revealed an improvement in the women's knowledge of MetS as their average total knowledge score increased from 37.1% before the intervention to 67.6% after the intervention.

7.3.2 Prevalence of MetS

The post intervention results again revealed that out of those who participated in the pilot study 17(24.3%) tested positive for MetS. A majority of 49(68%) had their MetS status changed from positive to at risk for MetS, while 4(5.7%) tested negative for MetS. MetS prevalence is therefore said to have reduced by 5.7% after the intervention.

7.3.3 Quality of Life

The study further revealed that, although the participants had an appreciable level of quality of life before the intervention, their quality of life improved tremendously after the intervention. From the post intervention results, the average physical, psychological, social and environmental health improved as follows: 75.9, 77.7, 64.5 and 72.0 respectively indicating a significant improvement in all the QOL domains after the intervention.

Results of a Tukey test conducted to compare the pre and post intervention knowledge and prevalence of MetS as well as the quality of life of the market

women revealed that there was a significant improvement in participants' knowledge, MetS parameters and quality of life after the MetS intervention programme.

7.4 CONCLUSION

Participants generally had poor knowledge of MetS before the intervention, however, their knowledge on MetS improves after the intervention. With regards to prevalence more than 70% of participants were either at risk or had MetS, but there was a reduction in the prevalence rate for those who had MetS after the intervention. Again, the quality of life of the women improved tremendously after the intervention although they had an appreciable level of quality of quality of life before the intervention.

Generally, the MetS intervention programme had a positive impact on the women as it resulted in lifestyle changes and made the women very conscious about their health and well-being. Some participants were skipping supper just to reduce n weight. They were very enthusiastic about the programme and were of the view that the duration for the programme was woefully inadequate. Other market women who were not part of the study, advocated and pleaded to be enrolled in the pilot study. The management of the Kaneshie market commended the research team and advocated that they should also be included in the study. However, based on the approved research proposal, time constraints and financial implications this was not possible.

The results of the current study indicate that a three-month physical activity, diet and health education programme for market women with MetS, contributed immensely in reducing the incidence of MetS, improving their knowledge of Mets as well as their quality of life. It also helped these women to adopt healthy lifestyles. The results in the current study are similar to Johangiry (2017) wherein the results showed that interactive MetS program with feedback and monitoring produced significantly relative improvement in adopting a healthy diet and physical activity habits and can lead to more improvement in MetS indicators over time. The results

therefore imply that a three-month exercise, diet and health education intervention could help reduce the incidence of MetS, and improve the quality of life of women with MetS.

7.5 LIMITATIONS AND CHALLENGES OF THE STUDY

A study of this nature is likely to have limitations. In this study, limitations were basically centered on the implementation of the MetS intervention programme.

The following are some of limitations encountered during the implementation of the study:

- Most participants preferred being weighed in their stalls where there were was no privacy rather than coming to the health room for the weekly weight checking, hence the research team had to acquire an additional mobile and portable weighing scale in order to reach out to such participants and the tried by all means to provide privacy (by improvising cloth as a curtain) although not to the satisfaction of the researchers.

- In terms of the exercises, trying to get a fixed time to organize a set programme was very difficult since the market is a very busy place. The women came in small numbers, group by group. Therefore, the envisaged group exercise programme that was going to attract other women did not materialize.

- Due to limited time and space, the study could not be extended to other people. It was specifically for people with MetS. Market women who were not part of the study but needed health checks like Blood pressure monitoring could not be attended to on some occasions. Hence the study may not be generalized to all settings

- The participants did not really have time to sit for the health talks after the weekly weight check session and aerobics due to their busy schedules and hence some preferred to do the exercises all by themselves without supervision.

7.6 RECOMMENDATIONS AND NURSING IMPLICATIONS

Implications for nursing research, Education and practice and policy

The issue of metabolic syndrome among women in Ghana and globally, comes with a wide variety of implications in nursing.

7.6.1 Community Health Practice

Based on the findings of the study the researcher recommends the following for the Kaneshie clinic

- A recommendation is that the Community health nurses at the Kaneshie clinic should collaborate with the management of the Kaneshie market and organize a give monthly health education of the market women. This should capture education on MetS and its complications, lifestyle changes such as healthy eating and regular exercises There is also the need to embark on yearly health screening for the market women.

- In addition, Market women diagnosed with diabetes and hypertension attending monthly clinic in the market should be screened regularly for prevalence of MetS in order to prevent cardiovascular diseases and other complications.

- A possibility for regular workshops for food vendors in the market should be explored with the intention of the food sellers being taught how they can modify the Ghanaian diet to prepare nutritious or healthy food.

- The final recommendation in collaboration with the researcher, is for community health nurses at the Kaneshie market to identify interested people who will help in establishing an ongoing MetS intervention programme in the market that include exercises.

- Women should be empowered to be active. They should take regular walking breaks and eat healthy.

7.6.2 Clinical Practice

- Health risk assessments which include anthropometric assessment should be done for all adult patients.
- Nurses working in diabetic and hypertensive clinics, should be oriented in MetS related aspects, in order to participate in awareness creation.
- Diabetic and hypertensive clinics should have protocols that capture diet and exercise therapy and not only medical treatment.

7.6.3 Education

- The researcher observed from personal encounter with the nurses at the clinic in the course of the research that generally most health workers themselves do not have in-depth knowledge about MetS. There is therefore the need for workshops and training programmes on MetS for community health nurses in the Kaneshie market clinic. This will enable them acquire the necessary knowledge and expertise in order to be abreast with and embrace the concept of MetS to enable them give appropriate education and information to the market women, and customers to help create awareness on MetS.

- The general public should be educated on MetS in the mass media to create awareness. Non-governmental organizations should collaborate with the government and Ministry of Health to embark on mass education in both urban and rural areas to help reduce the incidence of MetS. This is because, in Ghana, although the public is aware of non-communicable diseases like diabetes and hypertension, generally it was observed from this study that people lack knowledge on MetS and its complications.

- Nursing institutions should ensure visibility of MetS in the undergraduate programmes in Ghana.

7.6.4 Research

The following research studies are recommended:

- Further research to explore knowledge and practice of MetS interventions among nurses is s needed.
- The need for an action research to see if a larger study can be conducted on MetS intervention programme in the market.
- The need for participatory action research to enhance communities' knowledge about metabolic syndrome.

7.6.5 Policy makers

- The Ministry of Health should prioritise MetS in preventive programmes
- Policy makers such as the Ministry of Health and Ghana Health service to support hypertensive and diabetic clinics in creating awareness on MetS.

● Patients diagnosed with hypertension and diabetes and attending regular clinics should be screened regularly for MetS with support from the Ministry of Health.

7.6.6 Implications related to knowledge translation, uptake and sustainability

- There is the need for community engagement in designing MetS interventions in order to , enhance translation, uptake and sustainability of knowledge on MetS in diverse communities.
- Practical strategies should be used by health professionals to translate research knowledge between researchers and users into action.
- The need for health professionals to use diverse yet complementary methods in advancing knowledge translation and exchange on MetS regardless of the context.

7.7 CHAPTER SUMMARY

This chapter summarizes the entire research study which described processes followed in achieving the objectives of the study has been described and a conclusion drawn. The limitations identified during the study have also been outlined and recommendations related to health care, education needs, further research and policies have been suggested.

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Appendix 1

NOGOUCHI MEMORIAL INSTITUTE PERMISSION REQUEST LETTER

School of Nursing,
University of Ghana,
P.O. Box LG 43,
Legon, Accra.

The Chairperson,
Institutional Review Board-NMIMR
University of Ghana, Legon
Accra - Ghana.
Dear Sir/Madam,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH STUDY INVOLVING WOMEN AT THE KANESHIE MARKET COMPLEX

My name is Gloria Achempim- Ansong, I am a Registered Nurse and a lecturer at the University of Ghana. I am currently registered for a PhD Degree at the Faculty of Health Sciences of the University of the Witwatersrand, South Africa. I am required to complete a study under the guidance of a research supervisor as part of fulfilling the requirements for the PhD degree.
I hereby apply for permission and ethical clearance to undertake research among women at the Kaneshie Market. The University of the Witwatersrand Postgraduate Research and Human Ethics Committee have been approached for permission and ethical clearance.
The aim of the study is to develop and pilot test a metabolic syndrome intervention to promote the health and quality of life of market women identified to have signs suggestive of metabolic syndrome at the Kaneshie Market, in Accra, Ghana.
Upon receiving permission for conducting the study, permission will be sought from women working at the market who are willing to participate in the study.
I want to assure you that participation of market women in the study is absolutely voluntary and they will not be coerced to take part or be forced to give information they are not comfortable to share with others. Names of women participating in the study will not be disclosed to market management or in the research report. In addition, there is no risk involved and women will be allowed not to participate or withdraw from the study at any time.

For more information or queries regarding the study, I can be reached on:
0244753872(cell) and email: gloriaansong@yahoo.com or my supervisor

Dr.A.M Tshabalala at +277114884269 and email: amme.tshabalala@wits.ac.za.
However, should you have any problems or complaints that you have with this research process you can contact the University of the Witwatersrand's Human Research Ethics Committee (Medical):
Administrative Officer: 011 717 1234 direct
E: Rhulani.mkansi@wits.ac.za
Office email: hrec-medical.researchoffice@wits.ac.za
W: www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/

Thank you for taking time to read this letter.

Yours Faithfully,

---	---
Gloria Achempim-Ansong	Dr. A.M Tshabalala
Researcher	Supervisor

Appendix 1.I

NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH

Established 1979 A Constituent of the College of Health Sciences University of Ghana

Phone: +233-302-916438 (Direct)+233-289-522574
Fax: +233-302-502182/513202

E-mail: nirb@ngochi.ug.edu.gh

Telex No: 2556 UGL GH

NMIMR-IRB
Post Office Box LG 581

Legon, Accra, Ghana

3rd May, 2017

My Ref. No: DF.22
Your Ref. No:

INSTITUTIONAL REVIEW BOARD
ETHICAL CLEARANCE

FEDERAL WIDE ASSURANCE FWA 00001824 IRB 00001276

NMIMR-IRB CPN 088/16-17 IORG 0000908

On 3rd May, 2017, the Noguchi Memorial Institute for Medical Research (NMIMR) Institutional Review Board (IRB) at a full board meeting reviewed and approved your protocol titled:

TITLE OF PROTOCOL: Development and pilot testing of a metabolic syndrome intervention among market women in Accra, Ghana

PRINCIPAL INVESTIGATOR: Gloria Achempim-Ansong, PhD cand.
Please note that a final review report must be submitted to the Board at the completion of the study.
Your research records may be audited at any time during or after the implementation.
Any modification of this research project must be submitted to the IRB for review and approval prior to implementation.
Please report all serious adverse events related to this study to NMIMR-IRB within seven days verbally and fourteen days in writing.
This certificate is valid till 2nd May, 2018. You are to submit annual reports for continuing review.

Signature of Chait: ~ ~ .
Mrs. Chris Dadzie (NMIMR - IRB, Chair)

Appendix 1.II

NOGOUCHI MEMORIAL INSTITUTE ETHICAL CLEARANCE

NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH
Established 1979 A Constituent of the College of Health Sciences
University of Ghana

Phone: +233-302-916438 (Direct)
+233-289-522574
Fax: +233-302-502182/513202
E-mail: nirb@noguchi.ug.edu.gh

NMIMR-IRB
P. O. Box LG 581
Legon, Accra
Ghana

My Reference: DF 22

October 30, 2019
PhD cand. Gloria Achempim-Ansong
Dept. of Nursing Education, Uni. Of Witwatersrand, Johannesburg, S.A
P.O.Box, LG 43, Legon, Accra
Accra

RE: Our Study # 088/16-17 **At:** NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH-IRB
Dear Gloria Achempim-Ansong:

Meeting Date: 5/2/2018 **At:** NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH-IRB

Protocol Title:
Development and pilot testing of a metabolic syndrome intervention among market women in Accra, Ghana
This is to advise you that the above referenced Study has been presented to the Institutional Review Board, and the following action taken subject to the conditions and explanation
provided below.

Internal #: 1991
Expiration Date: 5/1/2019
On Agenda For: Renewal
Reason 1: Progress Report **Reason 2:**
Description:
IRB ACTION: Renewed
Condition 1:
Action
Explanation:
Yours Sincerely,

NMIMR-IRB
IRB Administrat

Appendix 2

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

R14/49 Mrs Gloria Achempim-Ansong

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M170371

NAME: (Principal Investigator)	Mrs Gloria Achempim-Ansong
DEPARTMENT:	Nursing Education Accra, Ghana
PROJECT TITLE:	Development and Pilot Tesing of an Intervention to Improve the Health Outcomes of Market Women with Metabolic Syndrome in Accra, Ghana
DATE CONSIDERED:	31/03/2017
DECISION:	Approved unconditionally
CONDITIONS:	South African Human Research Ethics Committees (HRECs) have no standing outside South Africa. Ethics approval is also required from local HRECs in Ghana
SUPERVISOR:	Dr AM Tshabalala
APPROVED BY:	Professor P. Cleaton-Jones Chairperson, HREC (Medical)
DATE OF APPROVAL:	19/07/2017

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 10004,10th floor, Senate House/3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand. I/We fully understand the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. in this case, the study was initially review March and will therefore be due in the month of March each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature

Date 30TH JULY, 2017

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix 3

KANESHIE MARKET PERMISSION REQUEST LETTER

School of Nursing,
University of Ghana,
P.O. Box LG 43,
Legon, Accra.

The Human Resource Manager
Kaneshie Market Complex
Accra - Ghana.
Dear Sir /Madam,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH STUDY INVOLVING WOMEN AT THE KANESHIE MARKET COMPLEX

My name is Gloria Achempim- Ansong, I am a Registered Nurse and a lecturer at the University of Ghana. I am currently registered for a PhD Degree at the Faculty of Health Sciences of the University of the Witwatersrand, South Africa. I am required to complete a study under the guidance of a research supervisor as part of fulfilling the requirements for the PhD degree.

I hereby request permission to conduct a research study among women at the Kaneshie Market. The Institutional Review Board of the Noguchi Memorial Institute for Medical Research, of the University of Ghana as well as the University of the Witwatersrand Postgraduate Research and the Human Ethics Committee have been approached for permission and ethical clearance.

The aim of the study is to develop and pilot test a metabolic syndrome intervention to promote health and quality of life of market women identified to have signs suggestive of metabolic syndrome at the Kaneshie Market in Accra, Ghana.

Upon receiving permission for conducting the study, permission will be sought from women working at the market who are willing to participate in the study.
I want to assure you that participation of market women in the study is absolutely voluntary and they will not be coerced to take part or be forced to give information they are not comfortable to share with others. Names of women participating in the study will not be disclosed to market management or in the research report. In addition there is no risk involved and women will be allowed not to participate or withdraw from the study at any time.

For more information or queries regarding the study, I can be reached on:
0244753872(cell) and email: gloriaansong@yahoo.com or my supervisor
Dr.A.M Tshabalala at +27114884269 and email: amme.tshabalala@wits.ac.za.

However, should you have any problems or complaints that you have with this research process you can contact the University of the Witwatersrand's Human Research Ethics Committee (Medical):
Administrative Officer: 011 717 1234 direct
E: Rhulani.mkansi@wits.ac.za
Office email: hrec-medical.researchoffice@wits.ac.za
W: www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/

Thank you for taking time to read this letter.

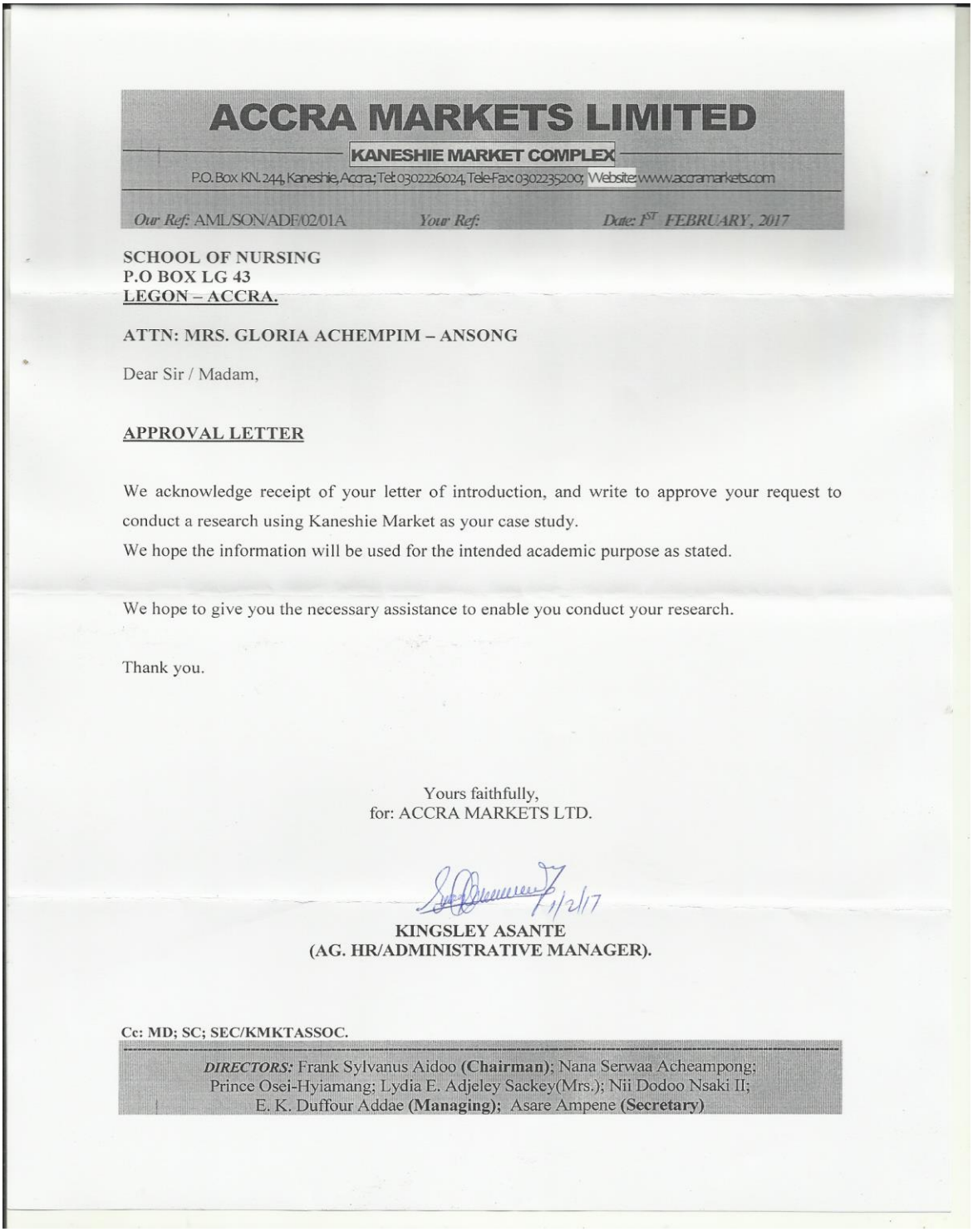
Yours faithfully,

---------- ----------

Gloria Achempim-Ansong Dr. A.M Tshabalala
Researcher Supervisor

Appendix 3.I

KANESHIE MARKET PERMISSION LETTER



ACCRA MARKETS LIMITED

KANESHIE MARKET COMPLEX

P.O. Box KN. 244, Kaneshie, Accra; Tel: 0302226024, Tele-Fax: 0302235200; Website: www.accramarkets.com

Our Ref: AML/SON/ADF/02/01A *Your Ref:* *Date:* 1ST FEBRUARY, 2017

SCHOOL OF NURSING
P.O BOX LG 43
LEGON – ACCRA.

ATTN: MRS. GLORIA ACHEMPIM – ANSONG

Dear Sir / Madam,

APPROVAL LETTER

We acknowledge receipt of your letter of introduction, and write to approve your request to conduct a research using Kaneshie Market as your case study.
We hope the information will be used for the intended academic purpose as stated.

We hope to give you the necessary assistance to enable you conduct your research.

Thank you.

Yours faithfully,
for: ACCRA MARKETS LTD.

1/2/17

KINGSLEY ASANTE
(AG. HR/ADMINISTRATIVE MANAGER).

Cc: MD; SC; SEC/KMKTASSOC.

DIRECTORS: Frank Sylvanus Aidoo **(Chairman)**; Nana Serwaa Acheampong; Prince Osei-Hyiamang; Lydia E. Adjeley Sackey(Mrs.); Nii Dodoo Nsaki II; E. K. Duffour Addae **(Managing)**; Asare Ampene **(Secretary)**

Appendix 4

KNOWLEDGE OF METABOLIC SYNDROME PREVENTION QUESTIONNAIRE DATA COLLECTION SHEET (MARKET WOMEN)

SECTION A: DEMOGRAPHIC DATA

RESEARCH CODE	Stall number

1. Please state your age

2. Period of trading at the Kaneshie market

3. Marital Status

Never married	1
Married	2
Divorced	3
Widowed	4
Living with Partner	5

4. Level of Education

None	1
Primary	2
Middle school	3
Secondary	4
Tertiary	5

5. Socio-cultural Group

Akan	1
Ewe	2
Ga	3
Other	4

6. Religion

Christian	1
Moslem	2
Traditional	3
Other	4

7. Have you been diagnosed with any of the under listed health problems?

Diabetes	Yes	No
Hypertension	Yes	No

8. Are you on any medication?

KNOWLEDGE OF METABOLIC SYNDROME PREVENTION QUESTIONNAIRE

1. Which of the following is not the definition of metabolic syndrome?
   1) Abdominal obesity
   2) High blood pressure, high fasting blood sugar
   3) Dyslipidaemia
   4) Uric acid abnormalities
   5) Do not know

2. As per the definition of metabolic syndrome, which of the following is best described the case of women's "waist is too thick"?
   1) Women's waist ≧ 75 cm or 29.5 inches
   2) Women's waist ≧ 80 cm or 35 inches
   3) Women's waist ≧ 85 cm or 35.5 inches
   4) Women's waist ≧ 90 cm or 36.4 inches
   5) 5 do not know

3. As per the definition of metabolic syndrome, which of the following is best described the case of "high blood pressure" ?
   1) Systolic blood pressure ≧ 120 mmHg or diastolic ≧ 80 mmHg
   2) Systolic blood pressure ≧ 125 mmHg or diastolic ≧ 85 mmHg
   3) Systolic blood pressure ≧ 130 mmHg or diastolic ≧ 85 mmHg
   4) Systolic blood pressure ≧ 140 mmHg or diastolic ≧ 90 mmHg
   5) Do not know

4. As per the definition of metabolic syndrome, which of the following is best described the case of "high fasting blood glucose"?
   1) Fasting blood glucose ≥ 90 mg / 100 c.c.
   2) Fasting blood glucose ≥ 100 mg / 100 c.c.
   3) Fasting blood glucose ≥ 110 mg / 100 c.c.
   4) Fasting blood glucose ≥ 120 mg / 100 c.c.
   5) Do not know

5. If one has metabolic syndrome, which of the following diseases may he/she likely have in future?
   1) Bone disorders
   2) Stroke
   3) Liver disorders
   4) Abdominal disorders
      Do not know

6. Which of the following is not directly related to "Waist is too thick"?
   1) Increased risk of hypertension
   2) Increased probability of rising blood sugar
   3) Increased probability of cancer
   4) Increased probability of rising blood lipids

5) Do not know

7. Which of the following habits lead to metabolic syndrome?
   1) Adequate sleep
   2) Regular exercise
   3) Smoking
   4) Eating high-fiber foods
   5) Do not know

8. Which of the following is <u>not</u> the self-care way to improve metabolic syndrome?
   1) In the case of stress, ignoring it or not asking people to assist
   2) More walking and exercise
   3) When cooking meals, choose steaming or boiling method instead of frying
   4) Reducing salt and refined sugar usage when seasoning food
   5) Do not know

9. Which of the following is <u>not true</u> in the medical treatment or care for patient with metabolic syndrome?
   1) Regular medical treatment
   2) If patient is prescribed with medication, he/she need to take medication on time
   3) Regular health checks (measurement of waist circumference, blood pressure, fasting blood glucose and blood lipids)
   4) For patient who is prescribed with medication, he/she needs not to take medication or follow-up re-examination if they are feeling alright.
   5) Do not know

= correct answer

Appendix 4.I

PERMISSION TO USE KNOWLEDGE OF METABOLIC SYNDROME PREVENTION QUESTIONNAIRE

From: Lai-Chu See [mailto:lichu@mail.cgu.edu.tw]
Sent: 08 February 2017 09:04 AM
To: Amme Tshabalala
Subject: Re: FW: Tool For Research on Knowledge of metabolic syndrome among Chinese Adults

Dear Amme:

You are welcome to translate the questionnaire (Knowledge of metabolic syndrome Prevention Questionnaire I designed) into English. If possible, would you please email me a copy of your English-translated version?

Sincerely,
Lai-Chu See (史麗珠), Ph.D
Professor
Dept. of Public Health, Chang Gung University
259 Wen-Hwa 1st Rd.
Kweisan, Taoyuan 333, Taiwan
tel: 886-3-211-8800 x 5119
fax: 886-3-211-8363

2017-02-06 17:58 GMT+08:00 Amme Tshabalala <Amme.Tshabalala@wits.ac.za>:
Dear Professor See
Re Research on Knowledge of metabolic syndrome Prevention: Questionnaire Development, Validity and Reliability
I am a lecturer at a university based in South Africa supervising a PhD student from Ghana who has similar interest. We would like to request permission to use the Knowledge of Metabolic Syndrome Prevention Questionnaire for our study.
In addition we would like to request permission to translate the Questionnaire to English as well as adapt it to the Ghanaian context.
Your assistance in this regard will be highly appreciated.
Yours sincerely.



Appendix 4.II

DATA COLLECTION SHEET (EXPERTS) VALIDATION OF K-MS QUESTIONNAIRE

SECTION B: DEMOGRAPHIC DATA

==========

1, 1 Research Code

1.2 Gender

1.3 Professional Qualification

1.4 Years of Experience

VALIDATION OF K-MS

PANEL OF EXPERTS EVALUATION: KNOWLEDGE OF METABOLIC SYNDROME AMONG MARKET WOMEN

Rating Scale					Comments
	1 Not relevant	2 Somewhat relevant	3 Quite relevant	4 Highly relevant	
1. Which of the following is **not** the definition of metabolic syndrome? 1) Abdominal obesity 2) High blood pressure, high fasting blood sugar 3) Dyslipidaemia 4) Uric acid abnormalities 5) Do not know					
2. As per the definition of metabolic syndrome, which of the following is best described the case of women's "waist is too thick"? 1) Women's waist ≧ 75 cm or 29.5 inches 2) Women's waist ≧ 80 cm or 35 inches 3) Women's waist ≧ 85 cm or 35.5 inches 4) Women's waist ≧ 90 cm or 36.4 inches 5) Do not know					
3. As per the definition of metabolic syndrome, which of the following is best described the case of "high blood pressure" ? 1) Systolic blood pressure ≧ 120 mmHg or diastolic ≧ 80 mmHg 2) Systolic blood pressure ≧ 125 mmHg or diastolic ≧ 85 mmHg 3) Systolic blood pressure ≧ 130 mmHg or diastolic ≧ 85 mmHg 4) Systolic blood pressure ≧ 140 mmHg or diastolic ≧ 90 mmHg 5) Do not know					
4. As per the definition of metabolic syndrome, which of the following is best described the case of "high fasting blood glucose"? 1) Fasting blood glucose ≥ 90 mg / 100 c.c. 2) Fasting blood glucose ≥ 100 mg / 100 c.c. 3) Fasting blood glucose ≥ 110 mg / 100 c.c. 4) Fasting blood glucose ≥ 120 mg / 100 c.c. 5) Do not know					

Rating Scale					
	1 Not relevant	2 Somewhat relevant	3 Quite relevant	4 Highly relevant	Comments
5. If one has metabolic syndrome, which of the following diseases may he/she likely have in future? 1) Bone disorders 2) Stroke 3) Liver disorders 4) Abdominal disorders 5) Do not know					
6. Which of the following is not directly related to "Waist is too thick"? 1) Increased risk of hypertension 2) Increased probability of rising blood sugar 3) Increased probability of cancer 4) Increased probability of rising blood lipids 5) Do not know					
7. Which of the following habits lead to metabolic syndrome? 1) Adequate sleep 2) Regular exercise 3) Smoking 4) Eating high-fiber foods 5) Do not know					
8. Which of the following is not the self-care way to improve metabolic syndrome? 1) In the case of stress, ignoring it or not asking people to assist 2) More walking and exercise 3) When cooking meals, choose steaming or boiling method instead of frying 4) Reducing salt and refined sugar usage when seasoning food 5) Do not know					
9. Which of the following is not true in the medical treatment or care for patient with metabolic syndrome? 1) Regular medical treatment 2) If patient is prescribed with medication, he/she need to take medication on time 3) Regular health checks (measurement of waist circumference, blood pressure, fasting blood glucose and blood lipids) 4) For patient who is prescribed with medication, he/she needs not to take medication or follow-up re-examination if they are feeling alright. 5) Do not know					

= correct answer

Appendix 4.III

PANEL OF EXPERTS INFORMATION LETTER

VALIDATION OF KNOWLEDGE OF METABOLIC SYNDROME AMONG MARKET WOMEN QUESTIONNAIRE _

School of Nursing,
University of Ghana
P.O. Box LG 43,

Legon, Accra.

Dear Sir/Madam,

INVITATION TO PARTICIPATE IN EXPERT PANEL REVIEW: KNOWLEDGE OF METABOLIC SYNDROME AMONG MARKET WOMEN IN ACCRA, GHANA (QUESTIONNAIRE)

I am a Ph.D. student at the University of the Witwatersrand, and currently conducting a study entitled "Development and pilot testing of a metabolic syndrome intervention among market women in Accra, Ghana" under the supervision of Dr. Amme M. Tshabalala (University of the Witwatersrand, Department of Nursing Education).The purpose of this study is to develop and pilot test an intervention to improve the health outcomes and quality of life of market women with metabolic syndrome in Ghana.

The study will be conducted in three phases.
In phase 1 a situational analysis which involves, two quantitative surveys aimed at exploring the knowledge of metabolic syndrome as well as anthropometric measurements to establish the prevalence rate among the market women and exploration of documented intervention for metabolic syndrome will be conducted.
I hereby invite you as an expert in the field of research, clinical nursing and medicine in assisting me to validate the designed knowledge of metabolic syndrome questionnaire. You will be asked to evaluate the instrument for content validity and appropriateness to the market women using a 4- point Likert Scale, where 1 connotes not relevant; 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant

Participation in the validation process is entirely voluntary. You may at any point withdraw or decline participation in the study if you wish. No identification of your personal information will be given when reporting your opinions so as to ensure anonymity and confidentiality.
If you consent to be part of the expert group, please complete the attached consent form and send it to me in the stamped addressed envelope enclosed

You will not derive any benefit from participation in this study, however, I hope the results will provide valuable information regarding knowledge of metabolic syndrome.

Please do not hesitate to contact me or my supervisor on the following telephone numbers and Email +233244753872, or gloriaansong@yahoo.com and +277114884269 or amme.tshabalala@wits.ac.za

Thank you in advance for your valuable input and participation, and for taking time to read this letter

Yours Sincerely,

---------- ----------

Gloria Achempim-Ansong Dr. A.M Tshabalala

Student Supervisor

Appendix 4.IV

PARTICIPANT CONSENT LETTER

EXPERTS REVIEW OF THE KNOWLEDGE OF METABOLISM QUESTIONNAIRE

I ---------- hereby confirm that I have read the

information letter and I understand the purpose of the, study, the research process and the possible positive health outcomes and improved quality of life of market women identified to have signs suggestive of metabolic Syndrome.

I therefore freely consent to participate in the panel of expert validation process. I understand that I may at any time of the study withdraw my consent and participation in the study.

_____ _____

Signature of participant Date

_____ _____

Researcher Date

Appendix 4.V

PRE- INTERVENTION PARTICIPANTS INFORMATION LETTER

KNOWLEDGE OF METABOLIC SYNDROME SURVEY

Hello,

My name is Gloria Achempim-Ansong, I am a Registered Nurse and a lecturer at the University of Ghana. I am currently registered for a PhD Degree at the University of the Witwatersrand in South Africa. I am required to complete a study under the guidance of a research supervisor as part of fulfilling the requirements for the PhD degree.

I would like to invite you to participate in a research study conducted here at Kaneshie Market. The aim of the study is to develop and pilot test a metabolic syndrome intervention to promote health and quality of life of market women identified to have signs suggestive of metabolic syndrome in Accra, Ghana. Permission from the market management to conduct the study has been granted.

Should you agree to participate, I will request you to complete a biographical data, and a questionnaire which will help me gain information about your knowledge of metabolic syndrome. This will inform the development of a metabolic syndrome intervention which will be implemented (pilot tested) to see if it will promote health and improve your quality of life should you be found to have metabolic syndrome, and also help reduce metabolic syndrome among market women in Ghana.

Please note: You will be requested again to participate in the study as a member of the pilot testing group if you are found to have metabolic syndrome.
The research activities will be conducted in a private place which is the space which is usually used for health screening activities at the administrative office of the market. Thus your privacy is assured.

A date and time convenient for you will be scheduled for the exercise. The required procedures should take approximately 30 minutes to complete.
Participation in this study is entirely voluntary. You may choose not to participate or withdraw from the study at any time, which will have no effect on the services you receive from this institution or the health care providers. You will not derive any direct benefit from participating in the study; however, I hope the completed study will help reduce the incidence of metabolic syndrome among women in Ghana. Your identity will not be revealed in any reports of this study. Results of the survey will be made available to the women participating in the study without revealing names of market stand numbers.

Thank you for taking the time to read this information letter. For more information or queries regarding the study or your rights as a study participant, I can be reached on 0244753872(cell) and email: gloriaansong@yahoo.com or my supervisor Dr. A.M Tshabalala at +277114884269 or email: amme.tshabalala@wits.ac.za.

However, should you have any problems or complaints that you have with this research process you can contact the University of the Witwatersrand's Human Research Ethics Committee (Medical):
Administrative Officer: 011 717 1234 direct
E: Rhulani.mkansi@wits.ac.za
Office email: hrec-medical.researchoffice@wits.ac.za
W: www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/
Thank you for taking time to read this letter.

Yours Sincerely,

---	---
Gloria Achempim-Ansong	Dr. A.M Tshabalala
Researcher	Supervisor

Appendix 4.VI

PRE- INTERVENTION PARTICIPANTS CONSENT FORM

KNOWLEDGE OF METABOLIC SYNDROME PREVENTION SURVEY _

I, _____ (participant's name) have read and understood the content of the information sheet which invites me to take part in the research study: development and pilot testing of a metabolic syndrome intervention to promote health and quality of life of market women identified to have signs suggestive of metabolic syndrome in Accra Ghana, and I have been given the opportunity to ask questions I might have regarding the procedure and my consent to being included in the study.

I understand that:

- Participation will involve me completing a questionnaire
- Participation is voluntary
- I may refuse to participate or withdraw my consent and stop taking part in the study at any time without penalty.
- My identification will be used to identify women with signs suggestive of metabolic syndrome as well as for writing a research report. However, no names will be mentioned I hereby freely consent to participate in this research study

_____ _____

Signature of participant Date

_____ _____

Researcher Date

Appendix 5

PRE-INTERVENTION: PREVALENCE OF METABOLIC SYNDROME DATA COLLECTION SHEET (MARKET WOMEN)

SECTION B: ANTHROPOMETRIC AND PHYSIOLOGIC MEASUREMENTS
==========

Research Code ---------- Stall Number ----------

1. Weight

2. Height

3. Waist circumference

4. Hip circumference

5. The Body Mass Index (B.M.I)

(Weight (kg)
Height (m2)

6.Waist-Hip Ratio
(Waist circumference)
Hip circumference

Physiological measurements.

7. Blood pressure

8. Blood Glucose

9 .Blood Cholesterol

Appendix 5.I

PRE- INTERVENTION PARTICIPANT INFORMATION LETTER

PRE- INTERVENTION PARTICIPANT INFORMATION LETTER

Hello,

Thank you for agreeing to participate in the first part of the study by filling in the knowledge of Metabolic Syndrome questionnaire.

We would like to request that you participate in a health status assessment activity.
Should you agree to participate, I will ask you to complete a biographical data, and then your weight, height and blood pressure will be measured. In addition, we are going to check your blood sugar and blood cholesterol levels. This will be done through a needle prick to obtain a sample of your blood. The results will be used to determine the number of women identified to have signs suggestive of metabolic so that a health promotion programme or metabolic syndrome intervention can be developed to promote health and quality of life of women working at the market.

Please note: you will be requested to go through these tests again six months after the intervention (if you are found to have signs suggestive of metabolic syndrome). This will help evaluate whether there has been an improvement in your health status as well as to help assess the success of the programme.

A date and time convenient for you will be scheduled for the tests. The required procedures should take approximately 30 minutes to complete. The tests will be conducted in a private place for health screening at the administrative office of the market. Thus, your privacy is assured.
Participation in this study is entirely voluntary. You may choose not to participate or withdraw from the study at any time, which will have no effect on the services you receive from this institution or the health care providers. Your identity will not be revealed in any reports of this study. Results of your health assessment will be given to you and in addition a referral letter will be written should a need arise.

For more information or queries regarding the study or your rights as a study participant, I can be reached on 0244753872(cell) and email: gloriaansong@yahoo.com or my supervisor Dr. A.M Tshabalala at +277114884269 0r +277834609913 and email: amme.tshabalala@wits.ac.za.

However, should you have any problems or complaints that you have with this research process you can contact the University of the Witwatersrand's Human Research Ethics Committee (Medical):
Administrative Officer: 011 717 1234 direct
E: Rhulani.mkansi@wits.ac.za
Office email: hrec-medical.researchoffice@wits.ac.za
W: www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/

Thank you for taking time to read this letter.

Yours Sincerely,

---	---
Gloria Achempim-Ansong	Dr. A.M Tshabalala
Student	Supervisor

Appendix 5.II

PRE- INTERVENTION PARTICIPANT CONSENT FORM

PREVALENCE OF METABOLIC SYNDROME (ANTHROPOMETRIC) _

I, _____ (participant's name) have read and understood the content of the information sheet which invites me to take part in the research study: development and pilot testing of an intervention to improve the health outcomes and quality of life of market women identified to have signs suggestive of metabolic syndrome in Accra Ghana, and I have been given the opportunity to ask questions I might have regarding the procedure and my consent to being included in the study.

I understand that:

- Participation will involve measuring of my weight, height as well as waist circumference and blood pressure. In addition, my blood sugar level and cholesterol will be checked through a finger needle prick.
- Participation is voluntary
- I may refuse to participate or withdraw my consent and stop taking part in the study at any time without penalty.
- My identification will be used to identify women who have signs suggestive of metabolic syndrome as well as for writing a research report. However, no names will be mentioned.

I hereby freely consent to participate in this research study.

_____ _____

Signature of participant Date

_____ _____

Researcher Date

Appendix 6

WHOQOL – BREF 26

WHOQOL–BREF

PROGRAMME ON MENTAL HEALTH
WORLD HEALTH ORGANIZATION
GENEVA

For office use only

	Equations for computing domain scores	Raw score	Transformed scores*	
			4-20	0-100
Domain 1	(6-Q3) + (6-Q4) + Q10 + Q15 + Q16 + Q17 + Q18 + + + + + +	=		
Domain 2	Q5 + Q6 + Q7 + Q11 + Q19 + (6-Q26) + + + + +	=		
Domain 3	Q20 + Q21 + Q22 + +	=		
Domain 4	Q8 + Q9 + Q12 + Q13 + Q14 + Q23 + Q24 + Q25 + + + + + + +	=		

* Please see Table 4 on page 10 of the manual, for converting raw scores to transformed scores.

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				poor nor good		
15 (F9.1)	How well are you able to get around?	1	2	3	4	5

The following questions ask you to say how **good or satisfied** you have felt about various aspects of your life over the last two weeks.

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
16 (F3.3)	How satisfied are you with your sleep?	1	2	3	4	5
17 (F10.3)	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18(F12.4)	How satisfied are you with your capacity for work?	1	2	3	4	5
19 (F6.3)	How satisfied are you with yourself?	1	2	3	4	5
20(F13.3)	How satisfied are you with your personal relationships?	1	2	3	4	5
21(F15.3)	How satisfied are you with your sex life?	1	2	3	4	5
22(F14.4)	How satisfied are you with the support you get from your friends?	1	2	3	4	5
23(F17.3)	How satisfied are you with the conditions of your living place?	1	2	3	4	5
24(F19.3)	How satisfied are you with your access to health services?	1	2	3	4	5
25(F23.3)	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to **how often** you have felt or experienced certain things in the last two weeks.

		Never	Seldom	Quite often	Very often	Always
26 (F8.1)	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	1	2	3	4	5

Did someone help you to fill out this form?.....

How long did it take to fill this form out?.....

Do you have any comments about the assessment?

.....

.....

THANK YOU FOR YOUR HELP

Appendix 6.I

PERMISSION TO USE THE WHOQOL-BREF 26

Dear Gloria,

Thank you for the form. Please find attached the English version of the WHOQOL-BREF, along with related materials.
Best regards,
Sibel Volkan (Mrs)

WHOQOL
Information, Evidence and Research (IER) Department
The World Health Organization
20 Avenue Appia
CH-1211 Geneva 27
Switzerland

From: Gloria Achempim-Ansong [mailto:gachempim@gmail.com]
Sent: 09 February 2017 11:32

To: whoqol

Subject: Re: Subject: Adoption of WHOQOL BREF 26

Dear Mrs. Sibel,

I hope this Email finds you well.
Please see attached the signed agreement for the permission to use the WHOQOL BREF 26.
Hoping to hear from you soon
Kind regards.
On Wed, Feb 8, 2017 at 12:37 PM, whoqol <whoqol@who.int> wrote:

Dear Ms Ansong,
Thank you for your interest in the WHOQOL-BREF. Please fill in the attached user-agreement form and return a signed copy to me by email; I will then send you the questionnaire, along with related materials, for free.
Best regards,
Sibel Volkan (Mrs)
WHOQOL
Information, Evidence and Research (IER) Department
The World Health Organization

Appendix 6.II

QUALITY OF LIFE SURVEY _PRE- INTERVENTION PARTICIPANTS INFORMATION LETTER

Hello,

Thank you for agreeing to be part of this research by filling in the knowledge of Metabolic Syndrome questionnaire and agreeing to tests conducted to assess your health status.

The results of your health status show that you have signs suggestive of Metabolic Syndrome. We would therefore like to request that you be part of the group of women that are going to be involved in the intervention programme.

This part of the study involves filling in a Quality of Life questionnaire. Please note that you will be requested to fill in the same questionnaire six months after the intervention (as a member of the pilot testing group) in order to assess the success of the programme.

Participation in this study is entirely voluntary. You may choose not to participate or withdraw from the study at any time, which will have no effect on the services you receive from this institution or the health care providers.
Should you agree to participate; a date and time convenient for you will be scheduled for the research activity. The research activity will be conducted in the private place for health screening at the administrative office of the market. Thus your privacy is assured.
You will be requested to sign a consent form and then fill in the questionnaire. Filling in of the questionnaire will take less than 30 minutes and we will be available to assist should you need help.
Your identity will not be revealed in any reports of this study. Results of the study will be given to you should you so wish.

For more information or queries regarding the study or your rights as a study participant, I can be reached on 0244753872(cell) and email: gloriaansong@yahoo.com or my supervisor Dr. A.M Tshabalala at +277114884269 or email at amme.tshabalala@wits.ac.za.

However, should you have any problems or complaints that you have with this research process you can contact the University of the Witwatersrand's Human Research Ethics Committee (Medical):
Administrative Officer: 011 717 1234 direct
E: Rhulani.mkansi@wits.ac.za
Office email: hrec-medical.researchoffice@wits.ac.za
W: www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/
.

Thank you for taking time to read this letter.

Yours Sincerely,

---	---
Gloria Achempim-Ansong	Dr. A.M Tshabalala
Researcher	Supervisor

Appendix 6.III

QUALITY OF LIFE SURVEY _ PRE- INTERVENTION PARTICIPANT CONSENT LETTER

I, _____ (participant's name) have read and understood the content of the information sheet which invites me to take part in the research study: development and pilot testing of a metabolic syndrome intervention among market women with in Accra Ghana, and I have been given the opportunity to ask questions I might have regarding the procedure and my consent to being included in the study.

I understand that:

- Participation will involve me completing a questionnaire
- Participation is voluntary
- I may refuse to participate or withdraw my consent and stop taking part in the study at any time without penalty.
- My identification will be used to identify women with signs suggestive of metabolic syndrome as well as for writing a research report. However, no names will be mentioned

I hereby freely consent to participate in this research study

_____ _____

Signature of participant Date

_____ _____

Researcher Date

Appendix 7

PRE-INTERVENTION: FOCUS GROUP DISCUSSION GUIDING QUESTIONS

'Please tell me, in your opinion what are the practices that may help to improve health outcomes?

Probes and prompting questions

- What is your own opinion about your own health?
- How can your health be improved?
- Do you have any question or any other information you wish to share?

Appendix 7.I

PRE-INTERVENTION: FOCUS GROUP DISCUSSION PARTICIPANT INFORMATION LETTER

Hello,

Thank you for your continuing participation in the research study. We would like to invite you to participate in a group discussion aimed at exploring your ideas or opinions about the kind of activities that could be implemented at the market to help promote health and quality of life of market women identified to have signs suggestive of metabolic syndrome in Ghana.
Participation in the group discussion is voluntary and it includes being audio recorded.
The recorded information is going to be transcribed verbatim and coded and will be kept under lock and key and will be available to only the researcher and her research mentor at the University of Ghana as well as the research supervisor at the University of the Witwatersrand.

Should you agree to participate, you will be divided into small group discussions that will take approximately 45 minutes to an hour. As we have explained before, the information you share with me will be used for the study without mentioning your name or any identifying data.
You may choose not to answer any questions that you don't feel comfortable to do so. You have a right to refuse to participate or withdraw from the study at any time, which will have no effect on the services you receive from the market or from the health care providers. Your identity will not be revealed in any reports of this study. Results of the study will be given to you should you so wish.
For more information or queries regarding the study or your rights as a study participant, I can be reached on 0244753872(cell) and email: gloriaansong@yahoo.com or my supervisor Dr.A.M Tshabalala at +277114884269 and email: amme.tshabalala@wits.ac.za.
However, should you have any problems or complaints that you have with this research process you can contact the University of the Witwatersrand's Human Research Ethics Committee (Medical):
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Office email: hrec-medical.researchoffice@wits.ac.za
W: www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/.
Thank you for taking time to read this letter.
Yours Sincerely,

---	---
Gloria Achempim-Ansong	Dr. A.M Tshabalala
Researcher	Supervisor

Appendix 7.II

PRE-INTERVENTION: FOCUS GROUP DISCUSSION CONSENT TO PARTICIPATE

I, _____ (have read and understood the content of the information sheet which invites me to take part in the group discussion. I understand that:

- Participation will involve me taking part in a focus group discussion.
- The interview will be audiotaped, and no names are required
- Participation is voluntary, and I may refuse to participate or withdraw my consent and stop taking part in the study at any time without penalty.
- My identification will be used to identify women who have signs suggestive of metabolic syndrome as well as for writing a research report. However, no names will be mentioned, and my information will be confidential.

I hereby freely consent to participate in this research study

_____ _____

Signature of participant Date

_____ _____

Signature of researcher Date

Appendix 7.III

PRE-INTERVENTION: FOCUS GROUP DISCUSSION CONSENT FOR AUDIO-RECORDING

I, _____ have read and understood the content of the information sheet which invites me to take part in the group discussion and the conversation to be audio-recorded.

I understand that:

- Participation will involve me taking part in a focus group discussion and be audio-recorded. I also understand that I may refuse to participate or withdraw my consent and stop taking part in the study at any time without penalty.

I have been informed that:

- The information that I discuss in the group will be used to develop a health promotion programme for prevention of Metabolic Syndrome and promoting health as well as for compiling a research report. However, no names will be mentioned, and my information will be confidential.

I have been informed that:

- My voice recording will be kept in a safe lockable place.

I hereby freely consent to be part of the focus group discussion that will include for the voice recording.

_____ _____

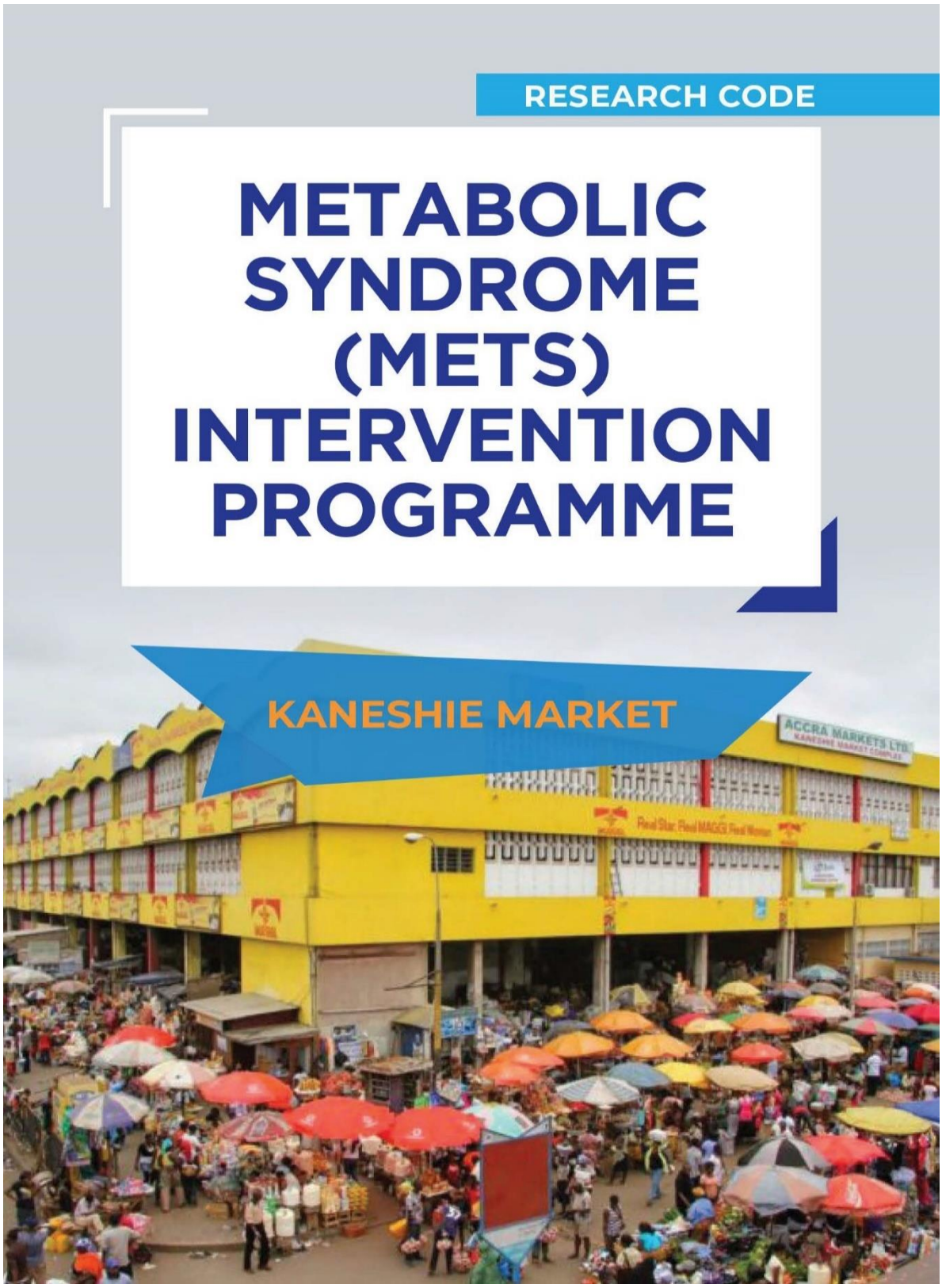
Signature of participant Date

_____ _____

Signature of researcher Date

Appendix 8

THE METABOLIC SYNDROME INTERVENTION PROGRAMME



WHAT IS THIS ALL ABOUT?

The purpose of this project is to develop a wellness program
For market women who are at risk or have metabolic syndrome.

It is anticipated that the Mets wellness programme will contribute towards improving health outcomes and enhancing the quality of life of market women with metabolic syndrome in Ghana.



WHY AM I IN THIS PROJECT?

Members of this project are market women who are at risk or Have signs suggestive of metabolic syndrome.

WHAT IS METABOLIC SYNDROME (METS)?

Metabolic syndrome is a group of risk factors that raises risk Of heart disease, diabetes, stroke, and other health problems.

HOW DO I KNOW I HAVE METS?

You are at risk or have mets if you have central (abdominal) obesity large waist circumference or "apple-shaped" body (>35inches i n women and > 40inches in men).

Plus any two (2) of the following risk factors:
- High blood glucose (sugar) ≥ 100 mg/dl (5.6 mmol/l),
- Low levels of HDL ("good") cholesterol in the blood: < 40 mg/dl (1.03 mmol/l) in males and < 50mg/dl (1.29 mmol/l) in females,
- High levels of triglycerides in the blood (≥ 150 mg/dl (1.7 mmol/l)
- High blood pressure (systolic bp ≥ 130 or diastolic bp ≥ 85 mmol/l

WHAT AM I EXPECTED TO DO IN THIS PROGRAM?

1. You will be required to enroll in the program.
2. You are expected to attend the wellness support group every week
3. There will be talk on healthy eating and how to exercise (group exercises eg. dancing)
4. Your weight will be checked weekly for 3 months, your b/p, blood glucose and cholesterol will be checked every 6 Weeks for 3 months
5. You will be put on a diet and exercise therapy

SUGGESTED EATING PLAN

	FOOD TYPE	ALWAYS LIST	SOMETIMES	NEVER
BREAKFAST	STARCH	**Choose one** 2 small laddles of wheat, oats, rice water, maize porridge, weanimix, millet, bitter cocoa with 2 slices of whole wheat bread/brown bread	Custard White bread	sweet biscuits Sugar and sugar products, sweets, cakes, honey, glucose
	PROTEIN	**Choose one** Low fat milk, Skim milk fish, lean meat, poultry Mushroom snails	eggs, red meat	Salted beef, corned beef, sausages, lobsters, crabs, Canned fish and meat , milo drink, turkey tail, organ meat such as intestines, whole milk
	FRUITS	**Choose one** 1 small or orange, tangerine, mangoes, ½ fist Grapes, ¼ sized pineapple 2 fingers of banana ¼ sized water melon 1/4 sized water melon	Ripped pawpaw, pineapple	Over ripped pawpaw, over ripped mangoes
	VEG	**Choose one** 1 small sized cucumber, 1 small sized of tomatoes lettuce, cabbage, spinach, kontomire, , carrot, okra, dandelion, alefu, Green pepper, onion, garden eggs	Over boiled vegetables	Excessively Boiled vegetables
SNACK		**Choose one** ¼ sized water melon, Medium sized apple Oranges, tangerine ,pineapple, banana, mangoes	ripped pawpaw, pineapple	Meat pie, pastries, kelewele, ice cream, soft drinks like Fanta, sugarcane, alcohol, salted foods like salted popcorn, Salted margarine, butter, shea butter, mayonnaise, cakes
LUNCH	STARCH	**Choose one** 4 slices of cocoyam, yam, sweet potato 2 small scoops of brown rice ½ a fist of all types of kenkey, , banku with stew, light and green soups	½ a fist of Fufu(more plantain, little cassava) Gari, White rice, palm oil, Olive oil, soya bean oil, sunflower oil in limited amount	Ripped plantain, kokonte, kelewele, coconut oil, palm kernel oil

	FOOD TYPE	ALWAYS LIST	SOMETIMES LIST	NEVER
	PROTEIN	**Choose one** fish, such as dried fish, herrings, lean meat, poultry, beans, mushroom, snails	red meat Egg	Sausages, bacon organ meat (intestines and kidneys), Shrimps, lobster crabs, corned beef, salted beef., turkey tail
	FRUITS	**Choose one** 1l medium-sized Apple, orange, tangerine, mango, 2 fingers of banana, ½ fist of Grapes ¼ sized Water melon, pineapple	Ripped Mangoes Ripped pawpaw	Over ripped pawpaw, over ripped mangoes
	VEG	**Choose one** Cabbage, green pepper, cucumber, cabbage, onion spinach, kontomire, carrot, garden eggs	Over-boiled vegetables	Excessively Boiled vegetables
SNACK		**Choose one** ¼ sized water melon, 1 Medium sized apple Oranges, tangerine	Ripped Pineapple, ripped pawpaw	Meat pie, pastries, kelewele, ice cream, soft drinks like Fanta, jam, jellies, Sweet biscuits, cakes
SUPPER	STARCH	**Choose one** 4 slices of cocoyam or yam 4 fingers of plantain, 2 small scoops of brown rice/ wheat ½ a fist of Fufu(enough plantain, little cassava ½ a fist of all types of kenkey, banku, tuo zafi	Gari White rice	Boiled cassava, kokonte, deep fried and soggy foods kelewele
	PROTEIN	**Choose one** Fish such as dried fish, herrings Lean meat Poultry Beans	Eggs, red meat	Sausages, salted beef, corned beef, canned meat and fish, crab, lobsters, turkey tail
	FRUITS	**Choose one** 1 small apple, oranges, tangerine 1/4 sized water melon ½ a fist of grapes	Ripped Mangoes Ripped pawpaw	Over ripped pawpaw, over ripped mangoes
	VEG	**Choose one** Green pepper, cucumber, lettuce, cabbage, spinach, kontomire, dandelion, alefu, okra, carrot, garden eggs	Ground-nut soup Palm nut soup	Excessively boiled vegeta-bles

EXERCISE PROGRAM

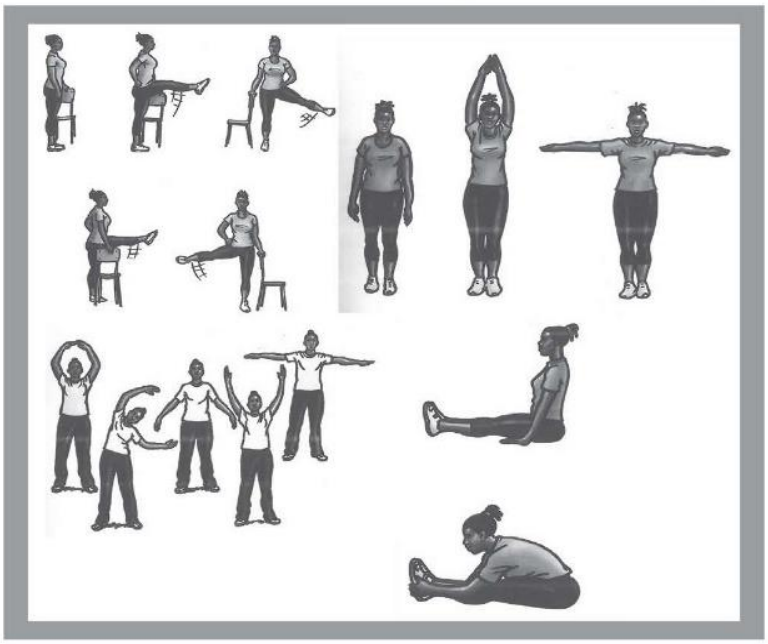
UNCONVENTIONAL EXERCISES

USE OF WATER GALLONS FOR WALKWAY (FOR WALKING)

WALKING (20-30 MINUTES EVERY DAY)



BASIC STRETCHES (10-15 TIMES)



BENDING AND SQUATTING TO TARGET HARD TO REACH AREAS



DANCING ("DI ASA") - 30 MINUTES EVERY MORNING



Wellness Monitoring Card/Program

Weeks	Weight loss	Weight lost	Total weight loss	Height	Body mass index	Blood Pressure	Blood Glucose	HDL	Trig	Comments
Baseline Results										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

OTHER FORMS OF EXERCISES THAT CAN BE PERFORMED AT HOME

I. Bending to sweep

II. Desilting Gutters

III. Gardening



CONVENTIONAL EXERCISES

Aerobic sessions with a professional trainer or instructor in the first week at the market premise,

Subsequently done on a weekly basis lead by a trained participant under supervision.

Wellness Monitoring Card/Program

Weeks	Weight loss	Weight lost	Total weight loss	Height	Body mass index	Blood Pressure	Blood Glucose	HDL	Trig	Comments
Baseline Results										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

WELLNESS MONITORING CARD/PROGRAM

Weeks	Weight loss	Weight lost	Total weight loss	Height	Body mass index	Blood Pressure	Blood Glucose	HDL	Trig	Comments
Baseline Results										
11										
12										
13										
14										
15										
17										
18										
19										
20										
21										

WEIGHT LOSS MONITOR AND REWARDS

1 KG	2 KG	3 KG	4 KG	5 KG
6 KG	7 KG	8 KG	9 KG	10 KG
11 KG	12 KG	13 KG	14 KG	15 KG

NOTE: YOU WILL BE REWARDED IF YOUR WEIGHT DECREASES

NOTE:

For More Information About This Programme, Contact

Mrs Gloria Achempim-Ansong
gachempim@gmail.com / gloriaansong@yahoo.com
Tel :+ 233 (0)244753872 | +233 (0)264753872

Dr. Amme Mardulate Tshabalala
Email: amme.tshabalala@wits.ac.za

Appendix 8.I

GUIDING QUESTIONS FOR EXPERT REVIEW

EXPERT REVIEW OF HEALTH PROMOTION PROGRAMME _

The expert review of the health promotion programme will be guided by the following questions;

1. Appropriateness of the programme for the community or population under study
2. Uniqueness to the community
3. Relevance of the programme to the community
4. Feasibility of the programme
5. Specificity of the programme to the population
6. Cultural sensitivity of the programme
7. Substantial contribution or solution to the problem

Appendix 8.II

PARTICIPANT INFORMATION LETTER

EXPERTS REVIEW OF THE HEALTH PROMOTION PROGRAMME

School of Nursing,
University of Ghana,
P.O. Box LG 43,
Legon, Accra.

Dear Sir/Madam,

INVITATION TO PARTICIPATE IN EXPERT REVIEW: DEVELOPMENT AND PILOT TESTING OF A METABOLIC SYNDROME INTERVENTION AMONG MARKET WOMEN IN ACCRA, GHANA

I am a Ph.D. student at the University of the Witwatersrand, and currently conducting a study entitled "Development and pilot testing of a metabolic syndrome intervention to improve the health outcomes of market women identified to have signs suggested of metabolic syndrome in Accra, Ghana" under the supervision of Dr. Amme M. Tshabalala (University of the Witwatersrand, Department of Nursing Education).The purpose of this study is to develop and pilot test a metabolic syndrome intervention to improve the health outcomes and quality of life of market women identified to have signs suggestive of metabolic syndrome in Ghana.

The study will be conducted in three phases.

In phase 1, two quantitative surveys aimed at exploring the knowledge of metabolic syndrome as well as anthropometric measurements to establish the prevalence rate among the market women will be conducted.
A quality of life quantitative survey will be conducted on a purposively selected total sample of market women with metabolic syndrome. Opinions regarding activities or measures that could be implemented to improve health outcomes of women with metabolic syndrome will also be achieved through qualitative focus group interviews.
Documented interventions or health promotion programmes for metabolic syndrome will be explore will be conducted using PubMed and CINAHL.
In phase 2, a health promotion programme or metabolic syndrome intervention will be developed based on the situational analysis findings from phase 1 and reviewed by experts.
In phase 3, the designed programme will then be pilot tested and evaluated.
I hereby invite you as a member of the expert panel to review the designed intervention programme.
I would like to assure you that participation in the intervention programme review process is confidential and that you may draw your participation at any time.

Thank you in advance for you valuable input and participation.

Yours Sincerely,

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Gloria Achempim-Ansong	Dr. A.M Tshabalala
Student	Supervisor

Appendix 8.III

PARTICIPANT CONSENT LETTER

EXPERTS REVIEW OF THE HEALTH PROMOTION PROGRAMME

I ---------- hereby confirm that I have read the information letter and I understand the purpose of the, study, the research process and the possible positive health outcomes to promote health and quality of life of market women identified to have signs suggestive of metabolic Syndrome.

I therefore freely consent to participate in the expert review process. I understand that I may at any time of the study withdraw my consent and participation in the study.

_____ _____

Signature of participant Date

_____ _____

Researcher Date

Appendix 8.IV

PILOT STUDY – PARTICIPANTS INFORMATION LETTER

METABOLIC SYNDROME INTERVENTION PROGRAMME

Hello,
Thank you for agreeing to be part of this research by filling in the knowledge of Metabolic Syndrome questionnaire and agreeing to tests conducted to assess your health status, and also agreeing to fill the quality of life questionnaire. The results of your health status show that you have signs suggestive of Metabolic Syndrome. We would therefore like to request that you be part of the group of women that are going to be involved in the intervention programme. This part of the study involves enrolling in a MetS intervention programme for a period of three months. Please note that you will be put on an exercise and diet intervention programme and you will be required to come to the health room every week for your weight to be checked. (as a member of the pilot testing group).
Participation in this study is entirely voluntary. You may choose not to participate or withdraw from the study at any time, which will have no effect on the services you receive from this institution or the health care providers.
Should you agree to participate; a time convenient for you will be scheduled for the weekly weight monitoring. The research activity will be conducted in the private place for health screening at the administrative office of the market. Thus, your privacy is assured.
You will be requested to sign a consent form and we will be available to assist should you need help.
Your identity will not be revealed in any reports of this study. Results of the study will be given to you should you so wish.
For more information or queries regarding the study or your rights as a study participant, I can be reached on 0244753872(cell) and email: gloriaansong@yahoo.com or my supervisor Dr. A.M Tshabalala at +277114884269 or email at amme.tshabalala@wits.ac.za.
However, should you have any problems or complaints that you have with this research process you can contact the University of the Witwatersrand's Human Research Ethics Committee (Medical):
Administrative Officer: 011 717 1234 direct
E: Rhulani.mkansi@wits.ac.za
Office email: hrec-medical.researchoffice@wits.ac.za
W: www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/
Thank you for taking time to read this letter.

Yours Sincerely,

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Gloria Achempim-Ansong	Dr. A.M Tshabalala
Researcher	Supervisor

Appendix 8.V

PILOT STUDY _ PARTICIPANTS CONSENT FORM

METABOLIC SYNDROME INTERVENTION PROGRAMME

I, _____ (participant's name) have read and understood the content of the information sheet which invites me to take part in the research study: development and pilot testing of a health promotion intervention to improve the health outcomes and quality of life of market women identified to have signs suggestive of metabolic syndrome in Accra Ghana, and I have been given the opportunity to ask questions I might have regarding the intervention and my consent to being included in the study.

I understand that:

- Participation will involve me enrolling in an intervention programme
- Participation is voluntary
- I may refuse to participate or withdraw my consent and stop taking part in the study at any time without penalty.
- My identification will be used to identify women who have signs suggestive of metabolic syndrome as well as for writing a research report. However, no names will be mentioned
  I hereby freely consent to participate in this research study

_____ _____

Signature of participant Date

_____ _____

Researcher Date

Appendix 8VI

WEEKLY WELLNESS MONITORING SHEET

METABOLIC SYNDROME INTERVENTION PROGRAMME

	WEEKS																	
	1									**2**								
PARTICIPANTS	**BASELINE WT**	**WT**	**HT**	**BMI**	**BP**	**BG**	**HDL**	**TRIG**	**COMMENT**	**BASELINE WT**	**WT**	**HT**	**BMI**	**BP**	**BG**	**HDL**	**TRIG**	**COMMENT**
P1																		
P2																		
P3																		
P4																		
P5																		
P6																		
P7																		
P8																		
P9																		
P10																		
P11																		
P12																		
P13																		

Appendix 9

POST INTERVENTION- PARTICIPANTS INFORMATION LETTER

Hello,

Once more thank you that you had agreed to participate in the gathering of information that helped to develop the intervention. We would also like to thank you for your participation in the intervention programme.
As we have explained before, the last phase of your participation includes taking part in filling in two questionnaires and the Metabolic Syndrome health assessment.
The two questionnaires are the same as the one you have filled in before. In the first questionnaire we would like to re-assess your knowledge of Metabolic Syndrome and in the second questionnaire your perceptions of your quality of life. In addition we are going to repeat the body measurements and the finger needle prick.
You are hereby being invited again to participate in the last phase of the research study.
As we have explained before; participation is voluntary and there are no risks involved. You have a right to withdraw from the study at any time without any consequences to you. All the research activities will be conducted in the private place designated for health screening at the administrative office of the market. Thus your privacy is assured.
A date and time convenient for you will be scheduled for the research activities. Both questionnaires should take approximately 30 minutes to fill in. The same applies to health assessment activities.
Your identity will not be revealed in any reports of this study. Results of the study will be given to you should you so wish.
Should you agree to take part in the study we would like to request that you please sign the three letters of consent.
We will be available to assist with filling in of the two questionnaires and conducting the health assessment activities.
All completed questionnaires will be kept in a locked desk drawer and the computer analyzed data will be password protected and will be accessed by the research, the mentor and the supervisor.
The summarized findings of the study will be made available to all women participating in the study and the report will be submitted to the University of the Witwatersrand for examination purposes.
For more information or queries regarding the study or your rights as a study participant, I can be reached on 0244753872(cell) and email: gloriaansong@yahoo.com or my supervisor Dr.A.M Tshabalala at +277114884269 0r +277834609913 and email: amme.tshabalala@wits.ac.za.
However, should you have any problems or complaints that you have with this research process you can contact the University of the Witwatersrand's Human Research Ethics Committee (Medical):
Administrative Officer: 011 717 1234 direct
E: Rhulani.mkansi@wits.ac.za
Office email: hrec-medical.researchoffice@wits.ac.za
W: www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/.
Thank you for taking time to read this letter.

Yours Sincerely,

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Gloria Achempim-Ansong	Dr. A.M Tshabalala
Student	Supervisor

Appendix 9.I

KNOWLEDGE OF METABOLIC SYNDROME PREVENTION SURVEY _ PARTICIPANTS CONSENT FORM (POST – INTERVENTION)

I, _____ (participant's name) have read and understood the content of the information sheet which invites me to take part in the research study: development and pilot testing of a health promotion intervention to improve the health outcomes and quality of life of market women identified to have signs suggestive of metabolic syndrome in Accra Ghana, and I have been given the opportunity to ask questions I might have regarding the procedure and my consent to being included in the study.

I understand that:

- Participation will involve me completing a questionnaire
- Participation is voluntary
- I may refuse to participate or withdraw my consent and stop taking part in the study at any time without penalty.
- My identification will be used to identify women who have signs suggestive of metabolic syndrome as well as for writing a research report. However, no names will be mentioned

I hereby freely consent to participate in this research study

_____ _____

Signature of participant Date

_____ _____

Researcher Date

Appendix 9.II

QUALITY OF LIFE SURVEYPARTICIPANT CONSENT LETTER (POST-INTERVENTION)

I, _____ (participant's name) have read and understood the content of the information sheet which invites me to take part in the research study: development and pilot testing of a metabolic syndrome intervention to promote health and quality of life of market women identified to have signs suggestive of metabolic syndrome in Accra Ghana, and I have been given the opportunity to ask questions I might have regarding the procedure and my consent to being included in the study.

I understand that:

- Participation will involve me completing a questionnaire
- Participation is voluntary
- I may refuse to participate or withdraw my consent and stop taking part in the study at any time without penalty.
- My identification will be used to identify women with signs suggestive of metabolic syndrome as well as for writing a research report. However, no names will be mentioned

I hereby freely consent to participate in this research study

_____ _____

Signature of participant Date

_____ _____

Researcher Date

Appendix 9.III

PREVALENCE OF METABOLIC SYNDROME (ANTHROPOMETRIC) _ PARTICIPANT CONSENT FORM (POST - INTERVENTION)

I, _____ (participant's name) have read and understood the content of the information sheet which invites me to take part in the research study: development and pilot testing of a metabolic syndrome intervention to promote heath and quality of life of market women identified to have signs suggestive of metabolic syndrome in Accra Ghana, and I have been given the opportunity to ask questions I might have regarding the procedure and my consent to being included in the study.

I understand that:

- Participation will involve measuring of my weight, height as well as waist circumference and blood pressure. In addition, my blood sugar level and cholesterol will be checked through a finger needle prick.
- Participation is voluntary
- I may refuse to participate or withdraw my consent and stop taking part in the study at any time without penalty.
- My identification will be used to identify women with metabolic syndrome as well as for writing a research report. However, no names will be mentioned

I hereby freely consent to participate in this research study

_____ _____

Signature of participant Date

_____ _____

Researcher Date

Appendix 10

PROGRAMME SATISFACTION ASSESSMENT TOOL

This assessment tool is designed to help you, the participant, determine if the program designed and delivered by the Researcher met the stated goals/ objectives.

For each statement, please tick the number listed below that most closely matches your feelings about that statement.

1=Strongly Agree 2=Agree 3=Neither 4=Disagree 5= Strongly Disagree

	Rating Scale					Comments
	1	2	3	4	5	
1. Overall, the program met the expected goals/objectives.						
2. The Researchers presented the intervention activities in a clear, concise manner.						
3. Activities chosen by Researchers were appropriate for our Group.						
4. Discussions were applicable to the goals/objectives.						
5. Researchers' actively engaged all participants in activity and discussions.						
6. Researchers facilitated connections between actions and behaviors and the stated goals/objectives.						
7. Program content accurately reflected the stated goals and objectives.						
8. Researchers were knowledgeable about the subject area.						
9. Researcher covered everything that needed to be discussed.						
10. Program duration was appropriate for achieving the goals.						
11. The program was too short.						
12. As a result of this research, I am now enlightened on metabolic syndrome and my quality of life has improved.						

Appendix 10.I

PERMISSION TO USE THE PROGRAMME SATISFACTION ASSESSMENT TOOL

Permission to use tool

Inbox x

Gloria Achempim-Ansong <gachempim@gmail.com>
Fri, Nov 23, 2018, 11:33 PM

to james.neill

Hello James,
I hope this email finds you well
Am Gloria from Ghana a phD student
I would like to seek your permission to use your program satisfaction assessment tool
Hope to hear from you and hope permission will be granted to me to enable me complete my data collection process.
Many thanks

James.Neill Sat, Nov 24, 2018, 7:47 AM
Hi Gloria, Which tool are you thinking of? (link?) But if it is wilderdom.com, it is free to use.
Sincerely, James --- James Neill Assistant Professor Centre fo

Gloria Achempim-Ansong Sat, Nov 24, 2018, 3:47 PM
Hello James Thank you for your response. Yes please it is the Wildercom program so satisfaction assessment tool.Thanks so much. Am grateful

Appendix 10.II

PARTICIPANTS SATISFACTION SURVEY _ PARTICIPANTS INFORMATION LETTER (POST INTERVENTION)

Hello,

Thank you so much that you had agreed to participate in the entire research study up to this point. The final phase of the research includes your assessment or evaluation of the success or failure of the intervention or health promotion programme and the whole research process.
You are hereby being invited again to participate in this final phase of the research study. This will require you being part of a participant satisfaction survey that seeks to find out your opinion about the health promotion programme. You are being required to once again fill a questionnaire.

As we have explained before; participation is voluntary and there are no risks involved. You have a right to withdraw from the study at any time without any consequences to you. This activity will be conducted in the private place designated for health screening at the administrative office of the market. Thus your privacy is assured.
A date and time convenient for you will be scheduled for the programme satisfaction survey. The questionnaire should take approximately 30 minutes to fill in. Your identity will not be revealed in any reports of this study. Results of the study will be given to you should you so wish.
Should you agree to take part in the survey, we would like to request that you please sign the letter of consent. We will be available to assist with filling in of the questionnaire.
The completed questionnaire will be kept in a locked desk drawer and the computer analyzed data will be password protected and will be accessed by the research, the mentor and the supervisor.

The summarized findings of the study will be made available to all women participating in the study and the report will be submitted to the University of the Witwatersrand for examination purposes.

For more information or queries regarding the study or your rights as a study participant, I can be reached on 0244753872(cell) and email: gloriaansong@yahoo.com or my supervisor Dr.A.M Tshabalala at +277114884269 0r +277834609913 and email: amme.tshabalala@wits.ac.za.

However, should you have any problems or complaints that you have with this research process you can contact the University of the Witwatersrand's Human Research Ethics Committee (Medical):
Administrative Officer: 011 717 1234 direct
E: Rhulani.mkansi@wits.ac.za
Office email: hrec-medical.researchoffice@wits.ac.za
W: www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/.
Thank you for taking time to read this letter.

Yours Sincerely,

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Gloria Achempim-Ansong Dr. A.M Tshabalala
Student Supervisor

Appendix 10.III

PARTICIPANTS SATISFACTION SURVEY - PARTICIPANTS CONSENT FORM (POST – INTERVENTION)

I, _____ (participant's name) have read and understood the content of the information sheet which invites me to take part in the programme satisfaction survey, and I have been given the opportunity to ask questions I might have regarding the procedure and my consent to being included in the survey.

I understand that:

- Participation will involve me completing a questionnaire
- Participation is voluntary
- I may refuse to participate or withdraw my consent and stop taking part in the study at any time without penalty.
- My identification will be used to identify women with signs suggestive of metabolic syndrome as well as for writing a research report. However, no names will be mentioned

I hereby freely consent to participate in this survey.

_____ _____

Signature of participant Date

_____ _____

Researcher Date

APPENDIX 11

INTEGRATIVE LITERATURE REVIEW - DATA EXTRACTION SHEET

No	**Author, year and Journal**	**Purpose/Aim & Research Design**	**Sample**	**Intervention description**	**Intervention details**	**Results/Effects**
1	Blackford, K., Jancey, J., Lee, A. H., James, A., Howat, P., & Waddell, T. (2016). *Journal of Behavioral Nutrition and Physical Activity, 1 13.* **CONCEPTUAL MODEL USED:** The Self-Determination Theory complemented by Motivational Interviewing	Two arm-Randomized controlled trial (quantitative)	Aged: 50-69yrs mean age (61years) N=401 (F = 66.5 % M=33.5%) Intervention=201 and control =200 Were recruited and screened	6-month home-based physical activity and diet intervention. The intervention group received the program materials at baseline and the control group was waitlisted. Lifestyle intervention program consisted of Weekly moderate physical activity (aerobics), increase in fibre intake and vegetable and decreased fat intake	Mode of information: Delivery: printed and online program materials and motivational support Interventions strategies also included self-monitoring and goal setting, and Motivational interviewing combined with regular email and telephone call support and feedback.	The findings demonstrate that 6-months programme of physical activity, nutrition, and weight management significantly improved metabolic syndrome parameters. .

2	Borkoles, E., Carroll, S., Clough, P., & Polman, R. C. J. (2016). *Maturitas Journal* **FRAMEWORK** Theory of self-determination theory	Randomized control trial	pre-menopausal obese women with the MetS Age: 24–55 years N=62 Intervention group (*n* = 31) Control group (*n* = 31).	3 month, intensive, community-based lifestyle intervention--Education - Follow up phone calls -Goals setting, problem solving and coping skills	Educational booklet on healthy eating, 3-week nutritional education course, at least 4 hours of physical activity per week (Circuit, Tai Chai and Aqua aerobic classes)	Diastolic blood pressure, high-density lipoprotein cholesterol and general psychological well-being improved. No significant difference was found for body mass.
3	Baetge, C., Earnest, C. P., Lockard, B., Coletta, A. M., Galvan, E., Rasmussen, C., Kreider, R. B. (2017). *Applied Physiology, Nutrition, and Metabolism*.	Randomized control trial AIM: to examine the effects of 4 commercial weight loss programs on MetS, weight loss, and several indices associated with health	Sedentary/overweight/obese women Age: 18–69 years N = 133 Groups CC (n = 29) WW (n = 29) JC (n = 27), Nutrisystem NS (n = 28) OR Control (n = 20)	A 12-week nutrition, & commercial weight loss and exercise on metabolic syndrome Curves Complete 90-day Challenge (CC) Weight Watchers Points Plus (WW) Jenny Craig At Home (JC) Nutrisystem Advance Select (NS) Control group (n = 20) was instructed	The participants were given the option of calling an NS consultant whenever needed to answer questions and/or for assistance with meal and exercise options. There were online resources available that included interactive tracking tools. Participants were able to track their food, fitness, weight, water, and other components. Counselors, dietitians, and other NS members were also available through the online resources to	The study revealed that the treatment groups attained a significant decrease in both energy intake and weight loss for all groups with the exception of the control groups. Also, advertising companies offering diet and exercise programs appeared to provide improvement in Mets.

				not to change their dietary intake or engage in PA for the12 weeks of the study but were randomized into one of the four diet groups once they completed their initial control group.	help increase success in the program. In the NS group, exercise was encouraged, and walking specifically was emphasized. The goal was to incorporate 10 min of PA, 3 times per day.	
4	Bo, S., Ciccone, G., Baldi, C., Benini, L., Dusio, F., Forastiere, G., Pagano, G. (2007). *Journal of General Internal Medicine*.	Two arm Stratified-Randomized Controlled 1-year Trial **AIM:** to compare the effectiveness of two different modalities (a lifestyle intervention program & standard unstructured information given by the family physician)	Age: 45-64yrs Gender: males and females No: 375 in northwestern Italy. ONLY N=335 agreed to continue with study.	A lifestyle intervention program with general recommendations carried out by trained professionals and standard unstructured information given by the family physician—in a dysmetabolic population-based cohort All subjects received general information, emphasizing	Participants: control group (n=188,169 gave informed consent), intervention group (n=187, 166 gave informed consent) the intervention group received detailed verbal and written individualized recommendations from trained professionals (nutritionists, specialists in endocrinology, and internal medicine).	Lifestyle modifications such as reduced fat intake and increased physical activity, meaningfully reduced metabolic syndrome with an absolute risk rate (AAR) of 31% and relative risk reduction of 47%.

				the importance of a healthy lifestyle from their family physicians. The controls did not receive further specific individualized programs. The intervention group received detailed verbal and written individualized recommendations from trained professionals		
5	Tran, V. D., Lee, A. H., Jancey, J., James, A. P., Howat, P., & Mai, L. T. P. (2017). British Medical Journal (*BMJ*).	Cluster-Randomised Controlled trial Data were collected by mixed- methods from a total of 214 intervention participants. Quantitative data were collected via surveys (n = 163); qualitative data via face-to-face exit interviews with intervention program completers (n = 10) and non-completers (n = 10), and brief post education session discussion	Age: 50-65yrs who are overweight. Mean age=57.61 Gender: male (40), female (174) No: 214 Quantitative data=163 Qualitative data=10 Non-completers=10	A 6-month community-based cluster-randomised controlled trial targeting adults with MetS from 10 communes in Hanam province, northern Vietnam through The Vietnam Physical Activity and Nutrition (VPAN) program.	A total of 417 participants were recruited into the program (intervention n = 214; controls n = 203) The VPAN intervention participants were provided with a resistance band and an information booklet containing advice and suggested activities on how to enhance physical activity and dietary behaviors. They were required to attend four 2-hour education sessions at months 1, 2, 3 and 4,	The study participants reported positive evaluations of the intervention resources (booklet and resistance band) and strategies (education sessions and walking group). These strategies were found to be successful and with our specific Vietnamese population group. A combination of printed resources, walking groups, and interactive face-to-face education sessions appeared to be a suitable approach in terms of improving physical activity and eating behaviors, and support health enhancing lifestyle

		AIM: to improve physical activity and nutrition for adults aged 50–65 years with Metabolic Syndrome in Vietnam		The VPAN program consisted of a range of resources and strategies, including an information booklet, resistance band, face-to-face education sessions, and walking groups.	and participated in walking groups established at each commune for 6 months. The walking groups met twice a week for 6 months.	behaviors in the Vietnamese adults.
6.	Yoon, N.-H., Yoo, S., & Kim, H. (2014). Osong Public Health Res Perspect Jouranl	Baseline sociodemographic data and MetS Characteristic of the study population (One group pre and post test design)	Age: 40+ years Gender: male and female No: 263 participants	A theory-based 12-week multicompone nt intervention	The intervention programs consisted of individual health counseling, health education classes, a booklet and newsletters for self-management. The participants set behavioral goals and strategies for their healthy lifestyle including dietary behaviors, physical activity, smoking, alcohol drinking, and stress management. .	Through the lifestyle intervention, the greatest change was observed in HDL cholesterol among men and blood pressure among women. Triglycerides and HDL cholesterol improved with blood pressure in men and abdominal obesity in women
7	Lee, J., Kim, Y., & Jeon, J. Y. (2016). Springer Plus Journal.	A cross-sectional design	The study was conducted by the Korean Ministry of Health and Welfare	24,178 individuals (males and	Physical activity including the physical activity type (vigorous and moderate activity,	The results established that physical activity meaningfully reduced the

			in 1999, 2010, 2011, and 2012. A total of 24,178 individuals, from 19 to 60 years of age, participated in health interviews and examinations by trained data collectors.	females), aged 19 to 60 years	walking, strength, and flexibility) and the frequency (numbers of days per weeks where physical activity lasted at least 10 min per session).	occurrence of metabolic syndrome.
8	Jahangiry, Montazeri, Najafi, Yaseri, & Farhangi, 2017) Nutritional Diabetes Journal	Two arm Randomized Controlled Trial. The two-arm randomized-controlled trial was conducted for patients with MetS from June through December 2012 in Tehran, Iran (6 months)	Age: 20+ years Gender: male and female No: 160 participants	Participants (n=160) were recruited through online registration on the study website. An interactive web-based intervention program (Lifestyle intervention by a web-based program on physical activity, dietary intake and several dimension of QoL.)	All study participants in intervention and control groups received general information about cardiovascular diseases and MetS indicators through the website and e-mail. Anthropometric measures, glycemic status, lipid profile, physical activity and food intake were evaluated at the beginning and after 6-month follow-up. Participants: control group (n=80), intervention (n=80)	The intervention and control groups of the demographic factors such as age, gender and education had no significant difference. Also in terms of assessment, both groups (control and intervention) showed greater changes in moderate physical activity.
9	A. T., & Anderssen, S. A. (2012). *Journal of Immigrant and Minority Health*.	Randomized controlled Trial	Age:20-60 Gender: male No: 150 immigrant Pakistani men living in Norway	A 5-month Physical Activity Intervention for 150 Pakistani immigrants living in Oslo, Norway.	In close collaboration with representatives from the target group, an intervention was developed to target the key social cognitive theory constructs (SCT).	The intervention group obtained a reduction in the serum insulin concentration and waist circumference as compared with the control group, but the intervention program did not reduce the prevalence of the MetS in

					The intervention program lasted 5 months. The control group members received their baseline results approximately 2 weeks after the testing, and organized exercise, one group lecture and written material following completion of the intervention were offered	Pakistani immigrant men living in Norway.
10.	Jahangiry, Montazeri, Najafi, Yaseri, & Farhangi, 2017) Nutritional Diabetes Journal	Two arm Randomized Controlled Trial. The two-arm randomized-controlled trial was conducted for patients with MetS from June through December 2012 in Tehran, Iran (6 months)	Age: 20+ years Gender: male and female No: 160 participants	Participants (n=160) were recruited through online registration on the study website. An interactive web-based intervention program (Lifestyle intervention by a web-based program on physical activity, dietary intake and several dimension of QoL.)	All study participants in intervention and control groups received general information about cardiovascular diseases and MetS indicators through the website and e-mail. Anthropometric measures, glycemic status, lipid profile, physical activity and food intake were evaluated at the beginning and after 6-month follow-up. Participants: control group (n=80), intervention (n=80)	The intervention and control groups of the demographic factors such as age, gender and education had no significant difference. Also in terms of assessment, both groups (control and intervention) showed greater changes in moderate physical activity.
	Mathieu, M.-E., Brochu, M., & Béliveau, L. (2008).		Age:	Diabetes Action: a 10-	Various modalities of exercises- aerobics (taking into consideration,	A reduction in the prevalence of metabolic

11	DiabetAction: Journal of Sport Medicine: *Official Journal of the Canadian Academy of Sport Medicine.*	1-group pre-test and post-test (quasi experimental design)	Gender: Male/female No:39	week program designed for health professionals who want to introduce metabolic syndrome in type 2 diabetic (T2D) and at-risk individuals to various modalities of exercise in order to increase activity levels.	cardiovascular resistance, flexibility and balance to increase activity levels) Group sessions of exercises were done under the supervision of an instructor Out of 39 participants, 29 took part in at least 50% of the group sessions	syndrome was measured post intervention
12	Jahangiry, L., Montazeri, A., Najafi, M., Yaseri, M., & Farhangi, M. A. (2017). An interactive web-based intervention on nutritional status, physical activity and health-related quality of life in patient with metabolic syndrome: a randomized-controlled trial (The Red Ruby Study). *Nutrition & Diabetes*, 7	Randomized controlled trial (quantitative)	Age: 18-78yrs, average 39.3 Gender: males=106, females=54 No:160	A 6 months web-based lifestyle program. Lifestyle changes, healthy nutrition, physical activity	Mode of information: Delivery: online intervention Individual/Group: Participants: Intervention control group	The researchers found out that, as the duration of an intervention increases, adherence to the intervention might decrease thereby decreasing metabolic syndrome
13	Owlasiuk, A., Chlabicz, S., Gryko, A., Litwiejko, A., Małyszko, J., & Bielska, D. (2014). *Annals of Agricultural and Environmental Medicine*: AAEM Journal	A cross sectional study	A total of 100 people aged 35–70 years. Predominantly 70% were females, and 30% males. The study was conducted in two general practice	Pedometer assessed physical activity of people with metabolic syndrome	The physical activity of people with metabolic syndrome was assessed using a pedometer. The patients were informed about how to use the pedometer.	The study revealed that the majority of people with metabolic syndrome represent a low or sedentary activity type. All activities leading

			clinics in Poland between June 2009 – October 2010		The device was placed at the waist and attached to the belt.	to an increase in activity gave the best results and health benefits (reduction in blood pressure, BMI improvement)
14	Verrusio, W., Andreozzi, P., Renzi, A., Martinez, A., Longo, G., Musumeci, M., & Cacciafesta, M. (2016).. *Annali Dell'Istituto Superiore Di Sanita, Journal*	Randomized clinical trial	Middle-aged and older adults with metabolic syndrome aged 50-69 years 30 participants comprising male and female. Participants were divided into three groups, with 10 participants in each group	6 months spinning training, combined with proper diet. The exercise was done twice a week	Patients were randomly assigned to receive treatment with diet (group A, n = 10), with diet and general gymnastics program (group B, n = 10), with diet and spinning physical training program (group C, n = 10). An instructor supervised the working group in the spinning exercises.	a significant reduction in blood pressure, lipid profile and fasting blood glucose in Homeostatic Model. Assessment of Insulin Resistance in waist circumference, no patient reported adverse events during follow-up. The results confirm the effectiveness of spinning training combined with diet in the management of MetS
15	Mark et al (2016). *The South African Medicine journal (SAMJ)*	A retrospective chart review of two physician led interventions in 4 rural communities in British Colombia Canada The intervention was open to both individuals wanting to lose weight and those interested in a non-pharmacological approach to managing insulin resistance.	The study evaluated health improvements among 372 participants at two physician-led interventions in a service contract (S1) and a fee-for-service practice context (S2); 139 participants were evaluated at S1 and 233 at S2, which	Life Intervention model was created in a rural primary care practice and spread to four other rural communities. Group and medical visits were done by way of monitoring	The foundation of the intervention model was group medical visits, with 15 - 25 participants overseen by a clinical facilitator The clinically facilitated meetings featured a presentation germane to living a healthier lifestyle, such as sugar addiction, medication management,	Participants in these LIs had unusually large improvements in health, particularly given the real-world contexts of the interventions.

			began 2 years after the creation of the LI model at S1		maintaining adherence while on vacation.	
16	Zeelie, Moss, Kruger & Van Rooyen (2010). *South African Journal for Research in Sports education and Research (SAJR SPER)*	To determine the effects of a 10-week physical activity (PA) intervention on selective metabolic syndrome markers in black adolescents Randomized control trial	Exp. Group A-194 subjects, boys and girls, in the grade 9 class (15-19 years) control group consisted of 57 adolescents from 5 secondary (high)schools	The PhysicaL Activity in the Young (PLAY) intervention. The experimental group participated in a 10week PA intervention. Body mass index (BMI), fasting insulin, fasting glucose, homeostasis model assessment of insulin resistance (HOMA-IR), systolic blood pressure (SBP), diastolic blood pressure (DBP), Windkessel arterial compliance (Cw), total peripheral resistance (TPR) and waist circumference	Each intervention session lasted one hour, consisting of aerobic activity (aerobic exercises, dancing, kata boxing) for 20 minutes, sport-specific activity (mini-soccer, ball skills) lasting 20 minutes, and strength and flexibility exercises (push-ups, lunges, stretching exercises) for 20 minutes.	The findings of this study suggest that a 10-week PA intervention showed a significant decrease in SBP and that of HOMA-IR, also there was an increased Cw in black adolescents. The implications of the results are that adolescents should be encouraged to increase their PA levels, in order to increase significant improvements in selective markers of the MS

				were measured.		
17	Kousar, R., Burns, C., & L ewandowski, P. (2008). Me tabolism Journal.	One group, Pre and Post Test	Female Pakistani immigrants residing in Melbourne, Australia 40 Pakistani women with metabolic syndrome (aged 20-50 years)	culturally appropriate diet and lifestyle intervention N=40.	Participants completed a 12-week culturally appropriate diet and exercise program under supervision	The study showed that the Pakistani female migrants who had metabolic syndrome and its components can successfully be treated via a culturally appropriate diet and lifestyle intervention.
18	Meckling, K. A., & Sherfey, R. (2007)*Applied Physiology, Nutrition, and Metabolism Journal.*	A randomized trial	A randomized trial of a hypocaloric high-protein diet, with and without exercise, on weight loss, fitness, and markers of the Metabolic Syndrome in overweight and obese women	A randomized trial of a hypocaloric high-protein diet, with and without exercise, on weight loss, fitness, and markers of the Metabolic Syndrome in overweight and obese women	The effects of 3:1 and 1:1 carbohydrate to protein ratios, hypocaloric diets with and without exercise, and risk factors associated with the Metabolic Syndrome was examined. The main outcome measures were weight loss, blood lipids, blood pressure, insulin, body composition, nitrogen balance, fitness, and resting energy expenditure	Cardiovascular fitness improved in both exercise groups. Significant changes in blood lipids included decreased total cholesterol in the HP and CONEx groups, decreased low-density lipoprotein cholesterol in the HP group only, and decreased blood triglycerides in the HPEx group only. High-density lipoprotein cholesterol, fasting blood glucose, and fasting insulin levels were perfect by diet or exercise
19	Saboya, P. P., Bodanese, L. C., Zimmermann, P. R., Gustavo, A. da S., Macagnan, F. E., Feoli, A. P., & Oliveira, M. da S. (2017). Arquivos Brasileiros de Cardiologia (*Arq Bras Cardiol) Journal*	A Randomized Controlled Trial	Age: 30-59 years Gender: males and females No: 72 individuals in Brazil randomized into 3 groups of	Individuals were randomized into three groups of multidisciplina ry intervention [Standard	Lifestyle Intervention on Metabolic Syndrome and its Impact on Quality of Life was assessed. Group and individual interventions were done.	There was a significant reduction in body mass index, waist circumference, systolic blood pressure at 3 months and the improvement of QOL, although it was significantly

			multidisciplinary intervention.	Intervention (SI) - control group; Group Intervention (GI); and Individual Intervention (II)] during 12 weeks (3 months) to 9months Most of the population studied was female, white and had high levels of education		associated with the physical functioning domain. The study demonstrated that lifestyle intervention produced beneficial effects on metabolic parameters, especially on weight loss and WC. The study demonstrated improvement in QOL in both groups after intervention.
20	Tran, V. D., Lee, A. H., Jancey, J., James, A. P., Howat, P., & Mai, L. T. P. (2016). *BristishMedical Journal (BMJ)* **Theoretical basis** Social cognitive theory (SCT)	A cluster-randomized controlled trial 6-month community-based cluster RCT to improve physical activity and dietary behaviours for adults aged 50–65 years with MetS in Hanam province located in northern Vietnam.	Vietnam adults with MetS in Hanam province located in northern Vietnam. Age: 50–65yrs Gender: Male and female No: 600	A 6- month physical activity and nutrition program	A combination of health education and walking programmes. The intervention comprised booklets, education sessions, resistance bands and attending local walking groups that provided information and encouraged participants to improve their physical activity and healthy eating behaviors during the 6month period. The control group participants	The study lead to improved lifestyle management and reduced risk of MetS

					received standard and 1-time advice Participants: control group (n=300), intervention group (n=300)	
21	Lerman, R (2011). *Functional Foods in Health and Disease Journal*	randomized, controlled study	Overweight and obesed women	A 12-week, randomized lifestyle intervention study in overweight and obese women with LDL ≥3.37 mmol/L (130 mg/dL) compared a Mediterranean -style, low-glycemic-load diet and soy/phytostero l-based medical food to an AHA low-fat diet	Participants were overweight and obese men and women with MetS, diagnosed according to ATP III criteria, with elevated LDL ≥3.37 mmol/L [130 mg/dL]. Both arms in the study followed the same lifestyle program consisting of the MED without imposed caloric restriction and participation in ~150 min/week of aerobic exercise.	Women in the MED/medical food arm had significantly lower TG/HDL ratios, with a mean reduction of 42% from baseline compared with 17% in the AHAD arm suggesting that subjects with MetS would be good targets for MED/medical food intervention.
22	Gerstel E[1], Pataky Z, Busnel C, Rutschmann O, Guessous I, Zumwald C, Golay A(.2013)*Diabetes Metab*. Journal	Randomized control trial	173 were eligible home care providers comprising an intervention group(n=129) and the control (n=44) group	The study evaluated the impact of lifestyle intervention on body weight, metabolic syndrome parameters, nutrition and	Participants in the intervention group followed an educational programme that encouraged physical activity and healthy nutrition, and were equipped with bicycles free of	At 12 months, a decrease in daily caloric intake and an increase in the percentage of participants engaging in physical activity were also observed in the intervention group. Lifestyle changes among HCPs can be achieved with relatively modest behavioral

				physical activity in home-care providers (HCPs)	charge. Anthropometric, biological and lifestyle parameters were assessed at baseline, and after 6 and 12 months	education and within a short period of time.
23	Pazaki, R., Nabipour, I., Seyednezami, N & Imami, S.R(2007*). Bio Med Central Journal.*	A randomized control trial Randomized stratified cluster random sampling	335 older women, aged 25-64	2 months increased physical activity, 5 days a week lasting 20 mins or at least 30 minutes	An audiotaped activity instruction with music and practical usage of educational package, was given to participants with weekly visits by volunteers from local non-governmental and community-based organizations	The intervention group exhibited significantly, greater decrease in systolic pressure
24	Claire Baetge, Conrad P. Earnest, Brittanie Lockard, Adriana M. Coletta, Elfego Galvan, Christopher Rasmussen, Kyle Levers, Sunday Y. Simbo, Y. Peter Jung, Majid Koozehchian, Jonathan Oliver, Ryan Dalton, Brittany Sanchez, Michael J. Byrd, Deepesh Khanna, Andrew, Jagim, Julie Kresta, Mike Greenwood, and Richard B.Kreider(2016).*Applied.Physiology. Nutritional. Metabolism Journal.*	Randomized control trial	133 over-weight women	Researchers randomized 133 sedentary, overweight women (age,47±11years; bodymass,86±14kg;body massindex,35±6kg/m2) In to respective treatment groups for 12weeks.	The goal of this study was to compare the Curves Complete 90-day Challenge (CC, n = 29), which incorporates exercising and diet, to programs advocating exercise (Weight Watchers Points Plus (WW, n = 29), Jenny Craig At Home (JC, n = 27), and Nutrisystem Advance Select (NS, n = 28)) or control (n = 20) on metabolic syndrome (MetS) and weight loss.	The researchers Observed a significant trend for a reduction in energy intake for all treatment groups and significant weight loss for all groups except control.
25.	Churilla, J. R., & Fitzhugh, E. C. (2012). *National*	Quantitative Design Cross sectional study	Sample included adults who participated in the	TPAV, PA, LTPA meeting the DHHS	NHANES used trained staff to	A reduced calorie DASH diet

	Health and Nutrition Examination. Journal.	AIM: This study examined the association of total physical activity volume (TPAV) and physical activity (PA) from three domains [leisure-time physical activity (LTPA), domestic, transportation] with metabolic syndrome.	1999–2004 National Health and Nutrition Examination Survey. N=5,620 U.S. adults 20 years and over who met the inclusion criteria. Gender: male and female	recommendation.	conduct in-home interview-administered questionnaires and standardized medical examinations conducted by physicians and other health-care professionals in mobile examination centers	compared to a control and weight loss diet reduced most of the metabolic syndrome risks in both men and women and also improved some components beyond that seen in a weight loss diet. When examining TPAV and LTPA, adults reporting the greatest volume of PA was found to have significantly lower prevalence estimates of metabolic syndrome compared to their less active and sedentary counterparts. Findings suggest that intensity, one of the parameters of PA volume, played an important role in the relationship between PA and metabolic syndrome.
26.	Sakulsupsiri, A., Sakthong, P., & Winit-watjana, W. (2016). *Value in Health Regional Issues Journal*	Cost-Effectiveness Analysis of a Self-Management Program (SMP) for Thai Patients with Metabolic Syndrome (Thailand)	90 patients – males/females (Control group - 44 and intervention - 46 patients).	Healthy lifestyle intervention program – Self management program The study assessed the cost-effectiveness and healthy lifestyle persistence of the self-	All patients were required to join in the following activities based on specified weeks where in Week 1: The intervention group took part in an exercise session Week 4: All patients were invited to fill out the self-management questionnaire.	The SMP provided by the health care settings was marginally cost-effective, and the program helped to minimize the complications and economic burden of the patients with MetS.

				management program (SMP), which was a lifestyle alteration program persistence, was performed Exercise sessions	Weeks 6 and 9: Each patient in the intervention group was called by the researcher to check for their retention of healthy behaviors using the self-management skills and for any problems that might have arisen. Week 12: Patients' anthropometric data and metabolic parameters were measured again, and the self-management questionnaire was also filled again by both groups to identify any changes from the baseline (week 0).	
27.	Lillian Kent, Darren Morton,[1] Paul Rankin,[1] Ewan Ward,[1] Ross Grant,[2] John Gobble & Hans Diehl(2013) .*Nutritional Metabolism Journal* (Lond).	This study examined the changes in MetS risk factors, in particular HDL, in a large cohort participating in a 30-day lifestyle intervention that promoted a low-fat, plant-based eating pattern.	Individuals (n = 5,046; mean age = 57.3 ± 12.9 years; 33.5% men, 66.5% women	Health improvement lifestyle intervention	Individuals (n = 5,046; mean age = 57.3 ± 12.9 years; 33.5% men, 66.5% women) participating in a in a Complete Health Improvement Program (CHIP) lifestyle intervention within the United States were assessed at baseline and 30 days for changes in body mass index (BMI), blood	HDL levels decreased by 8.7% despite significant reductions in BMI (-3.2%), systolic BP (-5.2%), diastolic BP (-5.2%), triglycerides (TG; -7.7%), FPG (-6.3%), LDL (-13.0%), total cholesterol (TC, -11.1%), TC: HDL ratio (-3.2%), and LDL: HDL ratio (-5.3%). While 323 participants were classified as having MetS, at the end of the program they no longer had this status

					pressure (BP), lipid profile and fasting plasma glucose (FPG).	after the 30 days, 112 participants acquired the MetS classification as a result of reduction in their HDL levels. It was concluded that as people move towards a low-fat, plant-based diet, HDL levels reduce while other indicators of cardiovascular risk improve