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ADOLESCENT WOMEN'S REPRODUCTIVE HEALTH CARE UTILISATION IN ZIMBABWE: A CONTEXTUAL INVESTIGATION.

By

Enock Ngome

Student Number: 584318

A Thesis Submitted to the Faculty of Humanities and Research in Partial Fulfilment of the Requirements for the Degree of

Doctor of Philosophy

In the Demography and Population Studies Program of the Schools of Public Health and Social Sciences

University of the Witwatersrand, Johannesburg. South Africa

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BIO-SKETCH OF MR ENOCK NGOME

Mr. Enock Ngome is a lecturer at the Department of Population Studies, University of Botswana. Mr Ngome has previously worked in the Ministry of Health as a Research Officer for eight (8) years where he conducted health and health-related research studies. He produced several technical research reports during this period at the Ministry of Health. He joined the University of Botswana in 1999 to coordinate a research project on "Equity on Reproductive Health in Botswana". He was later employed full-time as a lecturer in the Department of Population Studies of the University of Botswana in 2001. His main research interests include Sexual and Reproductive Health, HIV/AIDS, Drug Utilisation and the Ageing and has over fourteen years of experience teaching undergraduate courses in Computing for Demographers, Research Methods, Demographic Data Analysis and Report Writing, Epidemiology and Technical Demography, Indirect Estimation Techniques, Methods of Demographic Analysis; Migration, Urbanisation and Development, and Substantive Demography.

Mr Ngome enrolled into the PhD programme in the Demography and Population Studies (DPS) programme (University of the Witwatersrand) in February 2011. His PhD Thesis is titled "Adolescent Women's Reproductive Health Care Utilisation in Zimbabwe: A Contextual Investigation", under the supervision and tutelage of Professor Clifford Odimegwu.

The thesis hypothesizes that there is a significant relationship between community level characteristics and adolescent women's reproductive health care utilization. It also hypothesizes that the level of effects of individual and household characteristic on adolescent women's health care utilization in Zimbabwe will depend on the community level context in which the adolescent resides such as provincial quality of reproductive health care, provincial barriers to health care access and provincial socioeconomic development status. The thesis also hypothesises that the overall contribution of contextual effects of provincial quality of reproductive health care, provincial barriers to health care access and provincial socioeconomic development status to adolescent women's utilization of reproductive health care services in Zimbabwe outweigh that of individual and household level variables. Dependent variables used to define adolescent

women's use of reproductive health care services included use of health facility for delivery of last child, use of modern contraceptives and postnatal care service use.

The thesis found out that use of health facility for delivery of last child was a function of provincial barriers to health care access and socioeconomic development independent of adolescent woman's individual characteristics. Use of modern contraceptives was a function of provincial barriers to health care access which is independent of the adolescent woman's individual level variables. Postnatal care service utilization was also a function of provincial socioeconomic development which was independent of the women's individual level characteristics. Variation in utilization of reproductive health care by adolescent women between provinces is partly ascribed to provincial characteristics. Provincial characteristics are more important predictors of use of health facility for delivery, and postnatal care utilization than individual level characteristics. Individual level characteristics seem to be more important in determining modern contraceptive use among adolescent women than provincial characteristics. Provincial characteristics act as moderators for the association between adolescent women's individual level characteristics and reproductive health care utilization.

Since joining the PhD programme, Mr Ngome has had the opportunity to assist in tutoring, teaching and mentoring Honours and Masters' degree students. During the period in which Mr Ngome was completing his PhD (2011-2015), he attended and presented some of his research work at various conferences and workshops. Locally, he has attended and presented his work in several Mini-Conferences within the DPS programme in 2012 and 2013. Internationally, Mr Ngome has presented a poster at the Annual Population Association of America (PAA) in 2012, and presented two papers at the Fourth Botswana AIDS Impact Study Dissemination Workshop in 2014.

Furthermore, Mr Ngome has published 2 research articles which formed part of his PhD Thesis:

- **Ngome, E**. & Odimegwu, C. (2014). The social context of adolescent women's use of modern contraceptives in Zimbabwe: A multilevel analysis. *Reproductive Health,* 11, 64.

- **Ngome, E.** (2014). Women's autonomy and use of health facility for childbirth in Zimbabwe: Evidence from the 2010/11 Zimbabwe Demographic Health Survey. *Gender & Behaviour,* 12(4). 5953-5978.

Three more manuscripts from the doctoral dissertation have been submitted to journals for consideration. Two of which have been accepted, subject to corrections. These are:

- **Ngome, E.** & Odimegwu, C. Provincial Socio-economic Status and Adolescent Women's Utilisation of Postnatal Care in Zimbabwe. *Journal of Biosocial Science.*
- **Ngome, E.** Demographic, Socio-economic and Psychosocial Determinants of Condom Use among Adolescents in Botswana. *African Health Sciences Journal.*

Mr Ngome intends to continue his academic career as a lecturer in the Department of Population Studies at the University of Botswana. He will continue being involved in generating new knowledge through research in the areas of Sexual and Reproductive Health, Drug Utilisation, Ageing, and Methodological Issues in Population and Health.

Mr Ngome will liaise with the Zimbabwe Statistics Office (ZIMSTAT) and the Zimbabwe Ministry of Health to present the findings of his PhD Thesis. In addition to the two research articles and the two accepted manuscripts, there is an intention to publish four more papers from his thesis.

Thesis Dissemination Plan

TITLE	ABSTRACT	STATUS	JOURNAL	DATE OF SUBMISSION
1. The Social Context of Adolescent Women's Use of Modern Contraceptives in Zimbabwe: A Multilevel Analysis.	*The paper investigates the relationship between individual and community characteristics and adolescent women's use of modern contraceptives in Zimbabwe.*	*Published*	*Reproductive Health*	Published in 2014
2. Women's Autonomy and Use of Health Facility for Childbirth in Zimbabwe: Evidence from the 2010/11 Zimbabwe Demographic Health Survey.	*The paper examines the relationship between woman's autonomy and use of health facility for child in Zimbabwe.*	*Published*	*Gender & Behaviour*	Published in 2014
3. Provincial Socio-economic Status and Adolescent Women's Utilisation of Postnatal Care in Zimbabwe.	*The paper explores the provincial socio-economic status has an independent effect on adolescent women's utilisation of postnatal care (PNC) in Zimbabwe.*	*Under Review*	*Journal of Biosocial Science*	Under Review
4. The Role of Socio-economic Development on Place of Birth Delivery by Adolescent Women in Zimbabwe: A Multilevel Approach	*The paper explores the independent effects of socio-economic development on adolescent women's place of delivery. It also examines the moderating effects of socio-economic context on the relationship between individual characteristics and place of delivery.*	*Final Draft*	*African Population Studies Journal (APS)*	August 2015
5. Demographic and Socio-economic Factors associated with Place of Delivery for Adolescent Women in Zimbabwe.	*The paper examines the relationship between individual level factors and place of delivery for adolescent women in Zimbabwe.*	*Final Draft*	1. *Journal of Population Health and Nutrition* 2. *Journal of Adolescent Health*	October 2015
6. Does Access to Media and Religion Matter in Influencing Use of Postnatal Care Services by Adolescent Women in Zimbabwe.	*The paper examines the influence of access to media and religion on use of Post-Natal Care (PNC) services by adolescent women on Zimbabwe.*	*Initial Draft*	1. *African Journal of Reproductive Health* 2. *African Health Sciences Journal*	November 215

ABSTRACT

Background

Early childbearing brings with it heightened health risks for mothers and their infants. Studies have shown that early childbearing contributes significantly to maternal mortality. Adolescent are twice as likely to experience a maternal death as older women and the likelihood is higher in Sub-Saharan Africa (SSA) (Reynolds & Wright, 2004). Utilisation of reproductive health care services has been identified as an important step towards improving maternal health, as per the Sustainable Development Goal 3 & 5 (SDG 3 & 5). Despite the high maternal mortality rates in Zimbabwe, the use of reproductive health services by adolescent women is low. The proportion of adolescent women in sexual union currently using modern contraception is 35.4%, whereas 63.6% of adolescent women who had their last birth during the five years preceding the 2010 Zimbabwe Demographic Health Survey (ZDHS) used the health facility to delivery their child (ZIMSTAT & ICF International Inc., 2012). Postnatal care (PNC) services were used by 23.3% of adolescents during the two years preceding the survey. Understanding factors influencing adolescent women's use of reproductive health services would assist in developing appropriate reproductive health programmes aimed at improving utilisation of reproductive health services.

There has been a substantial attempt to study factors influencing adolescent reproductive health care utilisation in Sub-Saharan Africa (SSA), Very few of these studies explored the role of community-level characteristics on adolescent reproductive health care utilisation. The objectives of this thesis were (i) To examine the levels of reproductive health care utilisation by adolescents in Zimbabwe, (ii) To determine the association between micro-level variables and contraceptive use, utilisation of health facility for delivery and PNC services by adolescent women in Zimbabwe, (iii) To examine the independent effects of macro-level contextual variables on contraceptive use, utilisation of health facility for delivery and PNC services by adolescent women in Zimbabwe, (iv) To establish the moderating effects of the macro-level contextual variables on the association between micro level individual and household variables and contraceptive use, utilisation of health facility for delivery and PNC by adolescent women in Zimbabwe, and (v) To compare the overall contribution of macro-level contextual

variable effects to contraceptive use, utilisation of health facility for delivery and PNC by adolescent women with the contribution by micro-level effects.

This study posits that community characteristics are more critical predictors of adolescent reproductive health care utilisation in Zimbabwe, than other individual and household characteristics. This thesis used a modified Behavioural Model of Health Service Use (BMHSU) to explain the complex effects and interactions of individual and community-level variables on the use of reproductive health care services by adolescent women in Zimbabwe. The BMHSU was originally developed by Andersen and Newman in 1973 to explore the use of biomedical health services by focusing on the individual as the unit of analysis. Lately, another version of the BMHSU model, which is similar to that of Anderson (1995), was created to illustrate utilisation of maternal health services (Wild et al., 2010). In this a multi-layered explanatory model, the authors suggest that decision-making on use of health services should be seen in the broader social context and that it should be recognised as a multifaceted process intimately tangled with local belief systems and social relationships. It emphasises the importance of the contextual effects on decision-making and access to care. The importance of community-level factors in influencing women's decision to use health care services is also acknowledged.

The models by Anderson (1995) and of Wild and others (2010) were drawn with some modification to be compatible with adolescent reproductive health service utilisation situation in Zimbabwe. The models were modified to include community-level influence on reproductive health utilisation. It shows conceptual pathways between adolescent women's background and context (community-level) and their use of reproductive health services.

Methods

Data from the 2010/11 Zimbabwe Demographic Health Survey were used. The data provided both the micro-level (individual and household) variables, as well as macro-level (or contextual) variables. The dependent variables covered in this thesis included adolescent modern contraceptive use, utilisation of health facility for delivery, and use of PNC services. Macro-level variables examined in this study covered three main domains: quality of reproductive health care, barriers to health care access and socio-economic development. A total weighted sample of 452 adolescent women aged 15 to 19 years who

were in a sexual union was used to analyse data for adolescent modern contraceptive use. For utilisation of health facility for delivery and use of PNC, a weighted sample of 660 women who gave birth as adolescents during five years preceding the survey was analysed. To examine the independent effects of macro-level variables and to establish their moderating effects, multilevel modelling was employed using generalised linear mixed models (GLMM). The GLMM is an extension of the generalised linear models, such as logistic regression, in which the predictors contain random effects in addition to the usual fixed effects. The model reduces chances of misestimating the significance of variables that act at different levels of the hierarchy, when compared to use of the traditional regression methods. It has the capability to entangle the contextual effects from the compositional effects when estimating parameters for hierarchical data.

Results

Current contraceptive use among adolescent women in sexual union stands at 35.4% and differed significantly by provinces. Both micro-level characteristics and macro-level variables explained some variation on contraceptive use between provinces. The odds of contraceptive use increased with an increase in parity (Odds Ratio (OR), 12.4). Adolescent women with high media access were slightly more than twice as likely to be using modern contraceptives compared to those with no access to media (OR, 2.1). Only one macro-level variable had independent effects on contraceptive use - the odds of modern contraceptive use by adolescent women increased with an increase in the provincial barriers to health care access (OR, 2.211). The Intra-class Correlation Coefficient (ICC) was reduced to 9% indicating that the clustering of use of modern contraceptives was related to both individual and community level characteristics. There was a significant interaction between the provincial socio-economic development index and access to media by adolescent women on use of modern contraceptives. The positive impact of high media access on use of modern contraceptives was mitigated as the provincial socio-economic development index increased. Both the micro-level and macro-level variables explained some of the variation in adolescent contraceptive use across provinces, but did not explain the variation between provinces. However, individual-level variables were more important in predicting current contraceptive use by adolescent women than provincial-level variables.

Out of the 660 women who had their last birth as adolescents during the five years preceding the survey, 63.7% used the health facility for delivery. There was significant variation across provinces and it was attributed to both the micro-level and macro-level variables. Individual characteristics associated with place of delivery included age at birth, birth order, education, religion, media access, household wealth status and level of autonomy. Macro-level or contextual variables that had independent effects on the use of health facility for delivery included the provincial socio-economic development index (OR, 2.323) and provincial barriers to health care access (OR, 2.406). The ICC was reduced to 5.2% indicating that the clustering of use of health facility for delivery was related to both individual and community level characteristics. There was a significant interaction between the provincial quality to reproductive health care and level of education on use of health facility for delivery. The positive impact of education on place of delivery for the last child by adolescent was mitigated as the provincial quality of reproductive health care increased. Macro-level variables were better predictors of the use of health facility for childbirth by adolescents than individual-level variables.

The proportion of women who used PNC within 48 hours after delivery of their last child as adolescents was 23.9%. The significant variation between provinces was attributable to both micro-level and macro-level variables. Micro-level variables associated with use of PNC by adolescent women included access to media and level of autonomy. There was only one macro-level variable which had an independent effect on the use of health facility for delivery by adolescent women. Macro-level variables that had independent effects on the use of PNC was the provincial socio-economic development index (OR, 2.505). The ICC was reduced to 9% indicating that the clustering of use of PNC was related to both individual and community level characteristics. Significant interaction on use of PNC was found between provincial barriers to health care access and high media access. The positive impact of high access to media on the use of PNC by adolescent women was mitigated by an increase in the provincial barriers to health care access. Macro-level variables explained more of the cluster variation than the micro-level variables.

Conclusion and Policy Implications

Both individual and community characteristics determined reproductive health care utilisation outcomes. The low ICCs indicate clustering of utilisation of reproductive

health care services was related to both the individual and community level characteristics. Community characteristics however were more critical predictors of adolescent use of health facility and PNC by adolescent women than individual characteristics. However, the same could not be said about the relationship between predictors of modern contraceptive use by adolescent women in Zimbabwe. Residing in provinces with a high socio-economic development index was more critical in influencing the use of health facility for delivery and use of PNC services within 48 hours after delivery of child by adolescent women. Provinces with a higher proportion of women with barriers to health care access critically influenced use of health facility for delivery. Individual characteristics such as parity and level of media access critically influenced used of modern contraceptives than community characteristics. Community characteristics acted as independent determinants, as well as moderators, on the association between individual characteristics and reproductive health care utilisation. There was a considerable contribution of community-level characteristics to reproductive health care utilisation.

Reproductive health programme interventions aimed at increasing adolescent reproductive health care utilisation should take into account both individual and community characteristics. Policy makers should design programmes that encourage low fertility, attainment of at least secondary education by women, use of health facility for delivery, women's participation in the labour force and a reduction of poverty levels which will ultimately improve provincial socio-economic development. Programmes should consider finding a solution to deal with some aspects that may hinder access to health care, such as accessibility to the health care facility, provision of transportation to health facilities, and cultural norms. More emphasis should also be made on the importance of delaying childbearing by creating an understanding of the health and socio-economic consequences of early childbearing. There is also a need for further research that examines other community characteristics' influences, such as socio-political and cultural factors. This is important as provincial-level socio-economic development may involve social and political decision- making and cultural factors are likely to influence adolescent women's decision to use reproductive health care services.

This thesis builds on findings of previous studies by moving beyond the understanding of individual and household-level determinants of utilisation of reproductive health care

by adolescent women. Community-level characteristics do play an important role in influencing reproductive health care service use by adolescent women. Compared to individual and household-level characteristics, the overall contribution of community-level characteristics effects on the utilisation of reproductive health care services by adolescent women differ by reproductive health care outcome. For example, the contribution of community-level effects outweighs the contribution of individual and household characteristics in influencing the use of the health facility for delivery and PNC within 48 hours after delivery. However, the contribution of individual and household-level characteristics effects on reproductive health care use by adolescent women outweigh the contribution of community-level characteristics in influencing the use of modern contraceptives.

PLAGIARISM DECLARATION

I, Enock Ngome (Student Number: 584318), hereby submit my doctoral thesis in the field of Demography and Population Studies at the University of the Witwatersrand. I hereby declare the following:

- I confirm that the work submitted for assessment is my own work, except where indicated using the correct referencing.
- I confirm that this thesis does not incorporate any previously published material, except where references are explicitly provided.
- I declare that no portion of the work has been submitted for any degree, or part thereof, to this or any other University.
- I have followed the required conventions in referencing the thoughts and ideas of others.

Signature: _____ Date: _____

ACKNOWLEDGEMENTS

First, I would like to express my deepest and heartfelt gratitude to my PhD supervisor, advisor and mentor - Professor Clifford Odimegwu in the Demography and Population Studies Programme – for his guidance, patience, care, moral support and provision of a conducive environment for doing my research. There were times when I thought of quitting, but the continued encouragement on his part gave me strength to continue to the end. He has been pressing hard to ensure I finish on time and produce good scholarly work.

I would like to acknowledge the financial support of the University of Botswana who provided me with tuition fees, living allowance and per-diem and travel allowances for international conferences. I would like to further acknowledge the University of the Witwatersrand for awarding me with the Post-Graduate Merit Award, as well as providing me with the space and environment in which I was able to continue with my research work.

I would never have been able to finish my dissertation without the support of my family and wife, Shirley Mmapula Ngome, who kept on reminding me that "You are just about to finish". Her continued encouragement and undying love kept me going through the bad and the good times.

I am also thankful for the support and encouragement I received from my mother and parents-in-law for their continued well wishes. My siblings also need to be acknowledged for encouraging me to do well. I will always appreciate Sasha Frade of CITE Solutions for the many hours of proofreading.

Finally, it would not be possible for me to have gone through this if it were not for the Almighty God. It would not have been possible to pursue and finalise this thesis without His blessings.

DEDICATION

This thesis is dedicated to my family and several colleagues. Special dedication goes to my mother, Mrs Laiza Ngome and my wife Shirley Ngome for words of encouragement. My siblings Esinah Charumbira, Titus Ngome, Serty Leburu and Ishmael Ngome have been so encouraging as well and I am thankful. Lastly, I dedicate this work to my sons; Brandon, Brian, Kevin and Farai; and my only daughter, Tanatswa.

LIST OF ACRONYMS

AIDS	Acquired Immuno Deficiency Syndrome
AIC	Alkaike Information Criterion
ANC	Antenatal Care
BIC	Bayesian Information Criterion
BMHSU	The Behavioural Model of Health Service Use
CMC	Century Month Code
CPR	Contraceptive Prevalence Rate
CSO	Central Statistics Office
DHS	Demographic and Health Survey
DPS	Demography and Population Studies Programme
EA	Enumeration Area
HIV	Human Immunodeficiency Virus
ICC	Intra-class Correlation Coefficient
Inc.	Incorporated.
LAM	Lactational Amenorrhoea Method
PCA	Principal Component Analysis
PCV	Proportional Change in Variance
PNC	Postnatal Care (Postpartum Care)
SDG	Sustainable Development Goal
SE	Standard Error
SPSS	Statistical Package for Social Sciences Software
SSA	Sub-Saharan Africa
STI	Sexually Transmitted Infection
WHO	World Health Organization
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
VPC	Variance Partition Coefficient
ZDHS	Zimbabwe Demographic and Health Survey
ZIMSTAT	Zimbabwe National Statistics Agency

TABLE OF CONTENTS

BIO-SKETCH OF MR ENOCK NGOME ..... **I**
ABSTRACT ..... **V**
PLAGIARISM DECLARATION ..... **XI**
ACKNOWLEDGEMENTS ..... **XII**
DEDICATION ..... **XIII**
LIST OF ACRONYMS ..... **XIV**
TABLE OF CONTENTS ..... **XV**
LIST OF TABLES ..... **XVIII**
LIST OF FIGURES ..... **XX**
CHAPTER 1: INTRODUCTION TO THE STUDY **1**
1.1 BACKGROUND INFORMATION 1
1.2 THE PROBLEM STATEMENT 6
1.3 RESEARCH QUESTIONS 10
1.4 RESEARCH OBJECTIVES 11
1.4.1 General objective of the study *11*
1.4.2 Specific objectives *11*
1.5 DEFINITIONS AND DELIMITATIONS 12
1.6 JUSTIFICATION 13
1.7 ORGANISATION OF THESIS BY CHAPTER 14
CHAPTER 2: LITERATURE REVIEW **17**
2.1 OVERVIEW OF ADOLESCENT SEXUAL AND REPRODUCTIVE HEALTH 17
2.2 UTILISATION OF REPRODUCTIVE HEALTH CARE SERVICES BY ADOLESCENTS 19
2.3 DETERMINANTS OF UTILISATION OF REPRODUCTIVE HEALTH CARE SERVICES 20
2.3.1 Global overview *20*
2.3.2 Sub-Saharan Africa overview *28*
2.3.3 Overview of Zimbabwean studies *40*
3. DEFICIENCIES IN EXISTING LITERATURE 45
CHAPTER 3: THEORIES AND CONCEPTUAL MODELS **47**
3.1 THEORETICAL FRAMEWORK 47
3.2 CONCEPTUAL FRAMEWORK 49
3.3 HYPOTHESES 53
CHAPTER 4: METHODOLOGY **55**
4.1 STUDY SETTING 55
4.2 DATA SOURCE AND SAMPLE 56
4.3 DEPENDENT AND EXPLANATORY VARIABLES 57
4.3.1 Dependent (outcome) variables *57*
4.3.2 Independent variables *58*

4.4 STATISTICAL ANALYSIS 68
4.4.1 Univariate and Bivariate Analysis *68*
4.4.2 Multilevel Modelling *68*
4.4.3 Estimation of parameters *72*
4.5 MEETING THE STUDY OBJECTIVES 73
4.6 ETHICAL ISSUES 75
4.7 QUALITY ISSUES IN DATA 75
4.7.1 Reporting on household age *76*
4.7.2 Reporting of age in individual female interviews *78*
4.7.3 Discussion on data quality *84*
CHAPTER 5: PROFILE OF THE RESPONDENTS 86
5.1 CONTRACEPTIVE USE 86
5.2 USE OF HEALTH FACILITY FOR CHILDBIRTH AND PNC 87
5.3 COMMUNITY (MACRO/PROVINCIAL) LEVEL CHARACTERISTICS OF ADOLESCENT RESPONDENTS 88
CHAPTER 6: LEVELS AND DETERMINANTS OF REPRODUCTIVE HEALTH CARE UTILISATION BY ADOLESCENT WOMEN IN ZIMBABWE 90
6.1 PATTERNS OF REPRODUCTIVE HEALTH UTILISATION BY ADOLESCENT WOMEN 90
6.1.1 Modern contraceptive use *90*
6.1.2 Use of health facility for childbirth *92*
6.1.3 Use of PNC services *94*
6.2 DETERMINANTS OF REPRODUCTIVE HEALTH CARE UTILISATION BY ADOLESCENT WOMEN 96
6.2.1 Contraceptive use *96*
6.2.2 Use of health facility for delivery *99*
6.2.1 Use of PNC services *100*
CHAPTER 7: CONTEXTUAL INFLUENCES OF ADOLESCENT WOMEN'S REPRODUCTIVE HEALTH CARE UTILISATION IN ZIMBABWE 104
7.1 INTRODUCTION 104
7.2 MODERN CONTRACEPTIVE USE 106
7.2.1 Independent effects of macro-level variables on contraceptive use by adolescent women 106
7.2.2 Moderating effects of the macro-level variables on the association between individual/household variables and contraceptive use *115*
7.3 HEALTH FACILITY USE FOR DELIVERY 116
7.3.1 Independent effects of macro level contextual variables on utilisation of health facility for delivery of last child *116*
7.3.2 Moderating effects of the macro-level variables on the association between micro-level variables and utilisation of health facility for childbirth *125*
7.4 PNC SERVICE USE 126

7.4.1 Independent effects of macro-level variables on PNC service use by adolescent women 126

7.4.2 Moderating effects of the macro-level variables on the association between micro-level variables and utilisation of PNC services 135

CHAPTER 8: OVERALL CONTRIBUTION OF MACRO LEVEL CONTEXTUAL VARIABLES EFFECTS TO REPRODUCTIVE HEALTH CARE UTILISATION BY ADOLESCENT WOMEN IN ZIMBABWE 136

8.1 INTRODUCTION 136

8.2 USE OF MODERN CONTRACEPTIVES 136

8.3 USE OF HEALTH FACILITY FOR CHILDBIRTH 141

8.4 USE OF PNC SERVICES 143

CHAPTER 9: DISCUSSION OF STUDY HYPOTHESES 145

9.1 INTRODUCTION 145

9.2 STUDY HYPOTHESIS 1 145

9.3 STUDY HYPOTHESIS 2 146

9.4 STUDY HYPOTHESIS 3 147

9.5 STUDY HYPOTHESIS 4 148

CHAPTER 10: DISCUSSION 149

10.1 DISCUSSION ON OBJECTIVES 1 AND 2 149

10.2 DISCUSSION ON OBJECTIVES 3, 4 AND 5 155

10.3 METHODOLOGICAL ISSUES 161

10.3.1 Strengths of the Study 161

10.3.2 Limitations of the Study 165

CHAPTER 11: CONCLUSION AND RECOMMENDATIONS: POLICY, PROGRAMME AND RESEARCH 170

11.1 RESEARCH CONCLUSIONS AND POLICY IMPLICATIONS 170

11.1.1 Use of modern contraception 171

11.1.2 Use of health facility for delivery 173

11.1.3 PNC service utilisation 176

11.2 FRONTIERS FOR FURTHER RESEARCH 178

REFERENCES 182

APPENDICES 204

APPENDIX 1: PRINCIPAL ANALYTICAL RESULTS FOR PROVINCIAL (COMMUNITY-LEVEL) SOCIO-ECONOMIC DEVELOPMENT 204

ANNEXURES 210

ANNEXURE 1: POLICY BRIEF 210

ANNEXURE 2: PROFESSIONAL PROOFREADER'S CERTIFICATION 215

LIST OF TABLES

TABLE 1: COMMUNITY VARIABLES USED IN MODELLING USE OF MODERN CONTRACEPTIVES, HEALTH FACILITY FOR CHILDBIRTH, AND PNC SERVICES IN ZIMBABWE.....64

TABLE 2: INDIVIDUAL, HOUSEHOLD AND COMMUNITY VARIABLES USED IN MODELLING UTILISATION OF REPRODUCTIVE HEALTH CARE BY ADOLESCENT WOMEN IN ZIMBABWE.....64

TABLE 3: RESULTS OF THE AGE RATIOS FOR FEMALES AND MALES, AGE RATIO DEVIATIONS, SEX RATIOS, AND SEX RATIO FIRST DIFFERENCES FOR THE HOUSEHOLD POPULATION, 2010/11 ZDHS.....79

TABLE 4: PERCENTAGE DISTRIBUTION OF DE-FACTO 2010/11 ZDHS HOUSEHOLD POPULATION BY AGE GROUP AND AGE TERMINAL DIGITS.....81

TABLE 5: WHIPPLE'S INDEX SCALES FOR ESTIMATING THE RELIABILITY OF AGE DATA 81

TABLE 6: CALCULATION OF THE MYERS' METHOD TO AGE DATA FOR THE 2010/11 ZDHS HOUSEHOLD POPULATION.....82

TABLE 7: PERCENTAGE DISTRIBUTION OF ADOLESCENT WOMEN WHO HAVE HAD SEX DURING 12 MONTHS PRECEDING 2010/11 ZDHS BY SELECTED CHARACTERISTICS.....86

TABLE 8: PERCENTAGE DISTRIBUTION OF WOMEN WHO HAVE HAD THEIR LAST CHILD AS AN ADOLESCENT IN THE FIVE YEARS PRECEDING THE 2010/11 ZDHS SURVEY BY SELECTED CHARACTERISTICS.....88

TABLE 9: PERCENTAGE DISTRIBUTION OF ADOLESCENT WOMEN BY COMMUNITY (PROVINCIAL) LEVEL CHARACTERISTICS IN ZIMBABWE, 2010 DHS. 89

TABLE 10: LEVELS OF ADOLESCENT WOMEN'S REPRODUCTIVE HEALTH CARE USE IN ZIMBABWE BY TYPE OF REPRODUCTIVE HEALTH CARE.....91

TABLE 11: MEANS AND PERCENTAGE OF ADOLESCENT WOMEN IN SEXUAL UNION USING AND NOT USING MODERN CONTRACEPTIVES BY SELECTED CHARACTERISTICS (N=457). 91

TABLE 12: PERCENTAGE DISTRIBUTION UTILISING HEALTH FACILITY FOR DELIVERY AND PNC SERVICES BY SKILLED HEALTH PERSONNEL WITHIN 48 HOURS FROM TIME OF DELIVERY, BY SELECTED BACKGROUND CHARACTERISTICS (N=660). 93

TABLE 13: ODDS RATIOS SHOWING ASSOCIATION BETWEEN MICRO-LEVEL VARIABLES AND USE OF MODERN CONTRACEPTIVES BY ADOLESCENT WOMEN, 2010 ZDHS. 96

TABLE 14: CORRELATION MATRIX SHOWING CORRELATION COEFFICIENTS BETWEEN INDIVIDUAL-LEVEL VARIABLES USED IN THE LOGISTIC REGRESSION FOR USE OF HEALTH FACILITY FOR DELIVERY AND

PNC BY WOMEN WHO HAD THEIR LAST BIRTH AS ADOLESCENTS DURING THE FIVE YEARS PRIOR TO THE 2010 ZDHS. 98

TABLE 15: ODDS RATIOS SHOWING ASSOCIATION BETWEEN INDIVIDUAL AND HOUSEHOLD LEVEL VARIABLES AND USE OF HEALTH FACILITY FOR DELIVERY OF LAST CHILD BY ADOLESCENT WOMEN DURING THE FIVE YEARS PRECEDING THE SURVEY, ZIMBABWE. 100

TABLE 16: ODDS RATIOS SHOWING ASSOCIATION BETWEEN INDIVIDUAL AND HOUSEHOLD LEVEL VARIABLES AND USE OF PNC SERVICES AFTER DELIVERY OF LAST CHILD BY ADOLESCENT WOMEN DURING THE FIVE YEARS PRECEDING THE SURVEY, ZIMBABWE. 102

TABLE 17: MULTILEVEL ODDS RATIOS ASSESSING EFFECTS OF INDIVIDUAL AND COMMUNITY CHARACTERISTICS ON USE OF MODERN CONTRACEPTIVES BY ADOLESCENT WOMEN, ZIMBABWE (MODELS 1, 2 AND 3) 111

TABLE 18: MULTILEVEL ODDS RATIOS ASSESSING EFFECTS OF INDIVIDUAL AND COMMUNITY CHARACTERISTICS ON USE OF MODERN CONTRACEPTIVES BY ADOLESCENT WOMEN, ZIMBABWE (MODELS 4, 5 AND 6) 113

TABLE 19: MULTILEVEL ODDS RATIOS ASSESSING EFFECTS OF INDIVIDUAL AND COMMUNITY CHARACTERISTICS ON UTILISATION OF HEALTH FACILITY FOR CHILDBIRTH BY ADOLESCENT WOMEN, ZIMBABWE (MODEL 1, 2 AND 3) 120

TABLE 20: MULTILEVEL ODDS RATIOS ASSESSING EFFECTS OF INDIVIDUAL AND COMMUNITY CHARACTERISTICS ON UTILISATION OF HEALTH FACILITY FOR CHILDBIRTH BY ADOLESCENT WOMEN, ZIMBABWE (MODEL 4, 5 AND 6). 122

TABLE 21: MULTILEVEL ODDS RATIOS ASSESSING EFFECTS OF INDIVIDUAL AND COMMUNITY CHARACTERISTICS ON UTILISATION OF PNC AMONG ADOLESCENT WOMEN, ZIMBABWE (MODEL 1, 2 AND 3). 131

TABLE 22: MULTILEVEL ODDS RATIOS ASSESSING EFFECTS OF INDIVIDUAL AND COMMUNITY CHARACTERISTICS ON UTILISATION OF PNC AMONG ADOLESCENT WOMEN, ZIMBABWE (MODEL 4, 5 AND 6). 133

TABLE 23: ESTIMATION PREDICTED PROBABILITY THAT AN ADOLESCENT WOMAN WOULD USE MODERN CONTRACEPTIVES, A HEALTH FACILITY FOR CHILDBIRTH AND PNC SERVICES IN EXPOSED AND NON-EXPOSED GROUPS AND OVERALL CONTRIBUTION. 139

LIST OF FIGURES

FIGURE 1: CONCEPTUAL FRAMEWORK ON THE RELATIONSHIP BETWEEN COMMUNITY-LEVEL VARIABLES AND ADOLESCENT WOMEN'S REPRODUCTIVE HEALTH CARE UTILISATION, ADAPTED AND MODIFIED FROM ANDERSON (1995) AND WILD ET AL. 2010 52

FIGURE 2: MAP OF ZIMBABWE SHOWING THE 10 PROVINCES OF ZIMBABWE 56

FIGURE 3: BAR CHART SHOWING AGE RATIO DEVIATIONS FOR FEMALES AND MALES AS WELL AS FIRST DIFFERENCES DERIVED FROM THE SEX RATIOS, 2010/11 ZDHS 80

FIGURE 4: NUMBER OF WOMEN AGED 15 TO 49 YEARS INTERVIEWED DURING THE 2010/11 ZDHS BY SINGLE AGES 83

FIGURE 5: NUMBER OF WOMEN AGED 15 TO 49 YEARS INTERVIEWED DURING THE 2010/11 ZDHS BY 5 YEAR AGE GROUPS 83

FIGURE 6: PERCENTAGE DISTRIBUTION OF ADOLESCENT WOMEN'S UTILISING OF MODERN CONTRACEPTIVES, HEALTH FACILITY FOR DELIVERY AND POSTNATAL CARE SERVICES BY PROVINCE. 92

FIGURE 7: PROPORTIONAL CHANGE IN VARIANCE OF ADOLESCENT USE OF CONTRACEPTIVES IN ZIMBABWE BY MODEL USING MODEL 1 (EMPTY MODEL) AS A REFERENCE, 2010 ZDHS. 110

FIGURE 8: INTRA-CLASS CORRELATION (ICC) COEFFICIENT FOR USE OF MODERN CONTRACEPTIVES BY ADOLESCENT WOMEN IN PROVINCES IN ZIMBABWE, 2010 ZDHS. 110

FIGURE 9: PROPORTIONAL CHANGE IN VARIANCE FOR USE OF HEALTH FACILITY FOR DELIVERY OF LAST CHILD BY ADOLESCENT WOMEN IN ZIMBABWE BY MODEL USING MODEL 1 (EMPTY MODEL) AS A REFERENCE, 2010 ZDHS. 124

FIGURE 10: INTRA-CLASS CORRELATION (ICC) COEFFICIENT FOR USE OF HEALTH FACILITY FOR DELIVERY OF LAST CHILD BY ADOLESCENT WOMEN IN PROVINCES IN ZIMBABWE, 2010 ZDHS. 125

FIGURE 11: PROPORTIONAL CHANGE IN VARIANCE FOR PNC SERVICE UTILISATION WITHIN 48 HOURS AFTER DELIVERY OF LAST CHILD BY ADOLESCENT WOMEN IN ZIMBABWE BY MODEL USING MODEL 1 AS A REFERENCE, 2010 ZDHS. 129

FIGURE 12: INTRA-CLASS CORRELATION (ICC) COEFFICIENT FOR UTILISATION OF PNC SERVICES WITHIN 48 HOURS OF DELIVERY OF LAST CHILD BY ADOLESCENT WOMEN IN PROVINCES IN ZIMBABWE, 2010 ZDHS. 130

CHAPTER 1: INTRODUCTION TO THE STUDY

1.1 Background Information

Reproductive health problems faced by adolescents are a focus of attention globally, mainly due to the unacceptably high levels of pregnancy and childbearing among adolescent women. Compared to the developed world, adolescent pregnancy and childbearing in the developing countries is very common (Reynolds et al., 2006). Globally, an estimated 16 million adolescents aged 15 to 19 years give birth annually and this constitute 11% of all global births. The developing world contributes 95% of all births by adolescent women (UNFPA, 2013; WHO, 2011). Most of these are unplanned, despite contraceptive intentions and initiatives (Blanc et al., 2009). Regional average adolescent birth rate per 1000 women aged 15 to 19 years varies considerably. Africa has the highest birth rate per 1000 women aged 15 to 19 at 115, compared to the world average of 54 births. Adolescent birth rate is higher for Sub-Saharan Africa (SSA) region at 120 but varies considerably within the region with the lowest adolescent birth rate of 41 reported in Rwanda and the highest of 203 reported in Chad (UNFPA, 2013). The adolescent birth rate in Zimbabwe was reported at 115 (ZIMSTAT & ICF International Inc., 2012).

In Zimbabwe, early childbearing is still high and increasing unabated. About 21.2% of teenage women in Zimbabwe were either mothers or pregnant at the time of the 2005-06 Demographic Health Survey (DHS) (Central Statistics Office (CSO) Macro International Inc., 2007) and this proportion increased to 24% during the 2010/11 Zimbabwe Demographic Health Survey (ZDHS). The situation is compounded by poverty, gender based violence and limited access to services (ZIMSTAT & ICF International Inc., 2012).

Pregnancy and childbirth are the leading cause of death among adolescent women aged 15 to 19 years in developing countries (Mayor, 2004; UNFPA, 2004), and of all maternal deaths 13% are amongst adolescent women (Olukoya, 2004). Furthermore, in developing countries, adolescent women are twice as likely to die during pregnancy and childbirth as women in their 20s and the likelihood is even higher in Sub-Saharan Africa (SSA) (Reynolds & Wright, 2004). Such deaths contribute significantly to the burden of maternal health. In addition to maternal deaths, studies have found a positive relationship between adolescent pregnancy and poor pregnancy outcomes, such as low birth weight, pre-term

births and pregnancy wastage (Patton et al., 2009; Conde-Agudelo & Belizan, 2005; Senderowitz, 1995). This is exacerbated due to high incidents of unsafe abortion attempts and poor maternal health care, especially amongst unintended pregnancies (Magadi, 2006; Reynolds et al., 2006). Reproductive health care service utilisation has been identified as a practical intervention that can address this problem.

Utilisation of reproductive health services contributes significantly to the prevention of early pregnancies, and reduces risky pregnancies and premature mortality. Reproductive health services; such as use of modern contraceptives, antenatal care (ANC), institutionalized childbirth and postnatal care (PNC) are associated with improved maternal and neonatal health outcomes (Babalola and Fatusi, 2009; Harper et al, 2003; WHO, 2002; Zabin & Kiragu, 1998, Konje et al., 1993; Mahfouz et al., 1995; Scholl et al, 1994). Such services are crucial public health responses to reducing morbidity and mortality associated with adolescent sexual and reproductive health (SRH). Although reproductive health services are important to adolescent women, utilisation of reproductive health services in SSA is low. Understanding factors influencing adolescent women to make decisions to use reproductive health care services would promote informed policy development and effective reproductive health programme interventions.

In Zimbabwe, the maternal mortality ratio was estimated at 960 deaths per 100 000 live births during the 2010/11 ZDHS, which is indicative of an inadequate health care system. The high maternal mortality rate in Zimbabwe indicates that Zimbabwe is not on track in achieving the Sustainable Development Goal 3 of improving maternal health by 2030. Of the maternal deaths used to directly estimate the maternal mortality ratio in Zimbabwe for the seven year period preceding the 2010/11 ZDHS, 8.8% were deaths among women aged 15 to 19 years. This is an increase from 7.4% of deaths for the 10 year period preceding the 2005/06 ZHDS (ZIMSTAT & ICF International Inc., 2012; CSO and Macro International Inc., 2007). Despite the high level of maternal mortality, use of reproductive health care services by adolescent women in Zimbabwe remains low.

The high maternal mortality in Zimbabwe has been attributed to delays in families deciding to seek health care, transportation of mothers when the problem arises, and poor quality of maternal health services (Munjanja, 2007). Of all recorded maternal deaths, an estimated 70% were considered preventable. In 2012, an estimated 24% of maternal deaths were adolescents aged 15 to 19 years and only 9% had used maternal homes.

Although a high proportion of adolescent women in Zimbabwe have been reported to have ever heard of a modern method of contraception, only 35.4% of married and unmarried sexually active women indicated currently using modern contraceptive methods. There is a disproportionate use of other reproductive health services by adolescent women in Zimbabwe by type of service. The use of other reproductive healthcare services, such as institutional childbirth and PNC, remains a public health challenge. Although use of ANC services is relatively high for adolescent women in Zimbabwe (86.4%), use of health facilities for childbirth and PNC services remains much lower than use of ANC services. About two thirds (63.6%) of adolescents in Zimbabwe delivered their children at the health facility and 23.3% used PNC services within the recommended 48 hours (ZIMSTAT & ICF International Inc., 2012).

The high level of use of ANC services and the subsequent drop in the use of the health facility for childbirth and PNC services, as well as the low use of modern contraceptives by adolescents in Zimbabwe, is a cause for concern due to their associated negative reproductive health outcomes. According to the CSO and Macro International Inc. (2007), mothers under the age of 20 at the time of birth were more likely to report having a baby with low birth weight (less than 2.5 kilograms) than older mothers. Perinatal mortality and post-neonatal mortality for adolescent mothers aged less than 20 years was reportedly higher than that of mothers aged 20 to 39 years. Inevitably, understanding the factors that either encourage or inhibit adolescent use of these reproductive health services becomes crucial. This study examined the influence of individual, household and community-level factors on the decision to use contraceptives, health facility for childbirth, as well as PNC services in Zimbabwe.

Evidence has shown that early childbearing can impact negatively on adolescent women through impairment of their health and that of their offspring (Blanc et al., 2009). Studies have shown that early childbearing is associated with increased risks of adverse pregnancy outcomes (Conde-Agudelo & Belizan, 2005; Patton et al., 2009). In developing countries, complications during pregnancy and childbirth have been identified as the leading cause of death among adolescent girls. In most cases, adolescents face challenges that include impaired growth, small pelvic bone and poor nutrition, which often make them a high risk group for pregnancy and childbirth. Some studies also reveal a negative impact of early childbearing on the survival of newborn babies. Adolescent

mothers have higher rates of underlying negative health behaviours, as well as existing health problems that affect maternal and child health outcomes compared to older mothers (WHO, 2007). Some of which may be attributed to the lack of use of reproductive health services, such as use of contraceptives, health facility delivery and the use PNC services (Magadi et al., 2007).

The use of modern contraceptives has been recognised as an important contribution to improvements in public health. It remains one of the crucial factors that has a direct impact on fertility reduction (Bongaarts, 1978), as well as improvements in maternal and child health. In addition, it has a positive bearing on overall socio-economic development (World Bank, 2008). By 2015, 56 percent of married or in union women of reproductive age used modern contraception worldwide. Contraceptive use varies considerably between the developed and the developing world. The prevalence of modern contraceptive use in the developed world was 59 percent whereas the least developed world was lower at 32 percent. SSA has the lowest use of modern contraceptive prevalence rates estimated at 25 (Population Reference Bureau (PRB), 2015). This explains why the region is still having very high fertility rates and maternal mortality rates.

The total fertility rate in Zimbabwe has seen a decline from 5.5 in 1988 to 3.8 in 2010/11. Women aged between 20 and 35 years have experienced a substantial and sustained decline in age-specific fertility rates, but the same has not been experienced by adolescent women in Zimbabwe. The age specific fertility rates for women aged 15 to 19 year olds increased from 103 births per 1000 adolescent women in 1988 to 112 births in 1994. This rate decreased slightly to 99 births per 1000 women aged 15 to 19 years in 2010/11 (CSO and Macro International Inc., 2007).

The use of skilled birth attendants has also been recognised as one of the reproductive health interventions that would minimise maternal deaths (Danforth et al., 2009; Koblinsky et al., 2006). However, use of skilled birth attendants in SSA still remains low, with the proportion of women using skilled birth attendants below 50%. It is critical that factors influencing the use of skilled birth attendants be understood in order for informed and effective reproductive health interventions. Studies have found that there are discrepancies in the vulnerability to maternal deaths between adolescent women and their older counterparts (Olukoya, 2004).

Although reproductive health problems are similar for adolescents and their older counterparts, adolescent women face considerably more health risks during pregnancy and childbirth due to their physiological and psychological immaturity. Adolescent women aged 15 to 19 years biologically represent one of the age groups with the lowest mortality rates among women. Globally, they account for 15% of the burden of disease for maternal conditions and 13% of all maternal deaths (Olukoya, 2004; Senderowitz, 1995). The risk of dying from pregnancy related causes is much higher for adolescents than for older women mainly due to the poor maternal health care, especially for unintended pregnancies (Magadi, 2006; Reynolds et al., 2006; Reynolds & Wright, 2004). Furthermore, the major contributors to maternal deaths in developing countries are postpartum haemorrhage and hypertensive disorders. Postpartum haemorrhage is the leading cause of maternal deaths among women in Africa (Khan et al., 2006; WHO, 2012) and usually occurs in the early postpartum period.

Approximately two thirds of maternal deaths take place during the postpartum period (Ronsman & Graham, 2006). The majority of these deaths can be avoided by treating complications before they are emergencies, and some can still be treated even when they are emergencies. In SSA and the rest of the developing countries, the use of PNC has been recognised as a practical solution to curb the rate of maternal deaths that occur during this period (Sines etal., 2007). PNC offers the skilled health professionals an opportunity to assess clients in order to identify signs of serious maternal complications, in particular haemorrhage, pre-eclampsia and infections and, therefore, initiate treatment (Ononokpono et al., 2013; Titaley, Dibley & Roberts, 2009, Forte et al., 2006). It is also an opportunity to provide health checks on the newborn, provide treatment for the newborn if necessary, as well as provide counselling and support on issues such as family planning and nutrition (WHO, 1998). This forms an essential step towards achieving the Sustainable Development Goal 3 aimed at improving maternal health.

It is recommended that PNC health checks by skilled health professionals be made to both mother and the newborn within six to 12 hours after birth, three to six days after birth, six weeks after birth, and at six months (WHO, 1998). In Zimbabwe, since the majority of maternal and infant deaths occur within the first 48 hours after delivery, the Ministry of Health and Child Welfare (MoHCW) recommends that women seek PNC

services from a skilled health worker within 48 hours after delivery (ZIMSTAT & ICF International Inc., 2012).

Despite challenges in achieving desired levels in the use of reproductive health care services, Zimbabwe has created a favourable strategic and policy environment for the implementation of reproductive health programmes. As part of its mandate to give strategic direction to the improvement of reproductive health care, the MoHCW developed Zimbabwe's National Health Strategy 2009-2013 to provide the framework towards achieving the relevant MDGs. Together with the National Reproductive Health policy and the Maternal and Neonatal Health Roadmap 2007-2015 national sexual and reproductive health policy, systems and service levels are addressed (Ministry of Health and Child Welfare, 2012). To address adolescent reproductive health challenges, a National Adolescent Sexual and Reproductive Health (ASRH) Strategy was developed to provide a framework for realigning and strengthening the existing ASRH service delivery system and align it to the relevant MDGs (Government of Zimbabwe, 2009). The purpose of this thesis therefore is to investigate the influence of individual, household and community determinants of adolescent women's on utilisation of reproductive health care services in Zimbabwe.

1.2 The Problem Statement

The Millennium Development Goal 5 (MDG 5) of improving maternal health was aimed at reducing the maternal mortality ratio by three-quarters between 1990 and 2015 (United Nations, 2013). Currently, Sustainable Development Goal 3 (SDG 3) aims at reducing global maternal mortality ratio to less than 70 per 100,000 live births by 2030 (ICSU & ISSC, 2015). SSA has the highest maternal mortality ratio with an estimated 500 deaths per 100 000 live births (United Nations, 2013). The ratio has been halved since 1990 but is still has not reached the target. Achieving the MDG5 in Zimbabwe has been a huge challenge. The maternal mortality ratio in Zimbabwe increased from 555 in 2005 to 960 deaths per 100 000 live births in 2010 (ZIMSTAT & ICF International, 2012; CSO & Macro International, 2007). This places Zimbabwe among the countries with the highest maternal mortality ratio in SSA. The maternal mortality rate per 1000 women-

years of exposure has however decreased, but the maternal mortality rate for adolescent women in Zimbabwe decreased at a lower rate than that of women in general (ZIMSTAT & ICF International, 2012). Attaining the SDG 3 by Zimbabwe still remains a challenge due to the rampant poverty, economic instability and limited access to services.

One of the efforts to reduce the maternal mortality ratio is through reducing early childbearing and increasing the contraceptive prevalence rate. A decline in the birth rates among adolescents can only be achieved through increased access to safe, affordable, and effective methods of contraception. This will enhance the provision of greater choice and opportunity for responsible decision-making in reproductive health matters. In Zimbabwe, the modern contraceptive prevalence rate stood at 40.5% with huge variation between adolescent women and women aged over 20 years of age. The contraceptive prevalence rate among sexually active adolescents is much lower at 35.7% (ZIMSTA & ICF International, 2012.

The use of skilled birth attendants in Zimbabwe still remains low among adolescent women despite the high maternal mortality ratio in Zimbabwe, and there are no indications of improvement. In Zimbabwe, skilled birth attendants are mainly found in health facilities such as public and private hospitals, health centres and clinics. The proportion of adolescent women using a health facility for delivery decreased from 68.1% in 2005 to 63.6% in 2010 (ZIMSTAT & ICF International, 2012). In addition, the use of PNC services also remains very poor despite the benefits. Only 27.1% of women who gave birth to the last child during the two years preceding the survey used PNC services within the recommended two days (ZIMSTAT & ICF International Inc., 2012). The proportion of adolescent women who used PNC services was however less than 23.3% of the total number of women who accessed and used these services.

There has been extensive research to understand individual-level factors influencing the uptake of modern contraceptives due to the public and maternal health challenge brought about by early childbearing. Such studies have shown that there are demographic, socio-economic and psychosocial factors such as age, residence, education, socio-economic status, parity, autonomy, media access, desire for children, partner communication and intimate partner violence which in turn influence the use of modern contraceptives by women (Gotsens & Rodriguez-Sanz, 2012; Gilliam et al., 2011; Alio et al., 2009; Audu et al., 2008; Ruiz-Munoz et al., 2007; Oye-Adeniran et al., 2006;

Saleem & Bobak, 2005; Nagase, 2003; Cohen, 2000; Hindin, 2000; Odimegwu, 1999; Ekani-Bessala et al., 1998; Cleland et al., 1996).

Demographic and socio-economic factors such as maternal age, birth order, marital status, employment status, residence, socio-economic status, level of autonomy, religion and media access have been found to influence use of the health facility for delivery (Sonneveldt et al., 2013; Spangler & Bloom, 2010; Stephenson et al., 2006; Yanagisawa et al., 2006; Letamo & Rakgoasi, 2003; Moyer & Mustafa, 2013; Addai, 2000; Say & Raine, 2007; Kruk & Galea, 2007; Olusanya, Alkija & Inem, 2010; Fotso et al., 2010; Woldermicael, 2010; Gyimah, Takyi & Addai, 2006; Lou et al., 2012; Kwankye & Augustt, 2007). Knowledge on the determinants of PNC is still limited (Langlois et al., 2013); however, factors that have been found to be associated with the use of PNC services by women included age at birth, level of education, urban residence, household wealth, and exposure to mass media (Islam & Odland, 2011; Babalola & Fatusi, 2009; Forte et al., 2006; Bhatia & Cleland; 1995). In some studies, cultural issues, distance to the health facility and transportation problems were identified as important in influencing women to make a decision to use PNC services (Islam & Odland, 2011; Forte et al., 2006). Experiencing problems or complications with the previous delivery influenced use of PNC by women (Bhatia & Cleland, 1995).

Most of the studies aimed at understanding factors influencing the use of contraceptives, health facility for delivery and PNC services place much emphasis on the role of the effects of individual characteristics at the exclusion of community or contextual factors. However, there has been a growing number of studies that examine the effects of community-level factors on use of reproductive health care services. Such studies have demonstrated the importance of considering community-level effects on maternal health. Community level factors have been found to have an effect on contraceptive use (Dynes et al., 2012; Kaggwa et al., 2008; Stephenson et al., 2008; Stephenson & Tsui, 2002, Chacko, 2001,), use of antenatal care (Ononokpono et al., 2013a; Gage, 2007; Reynolds et al., 2006; Gage & Calixte, 2006; Magadi et al., 2003; Glei et al., 2003; Stephenson & Tsui, 2002; Magadi et al, 2000,), use of health facility for childbirth (Aremu et al., 2011; Kruk et al., 2010; Tavish et al., 2010; Gage, 2007; Babalola & Fatusi, 2009; Stephenson et al., 2006; Reynolds et al., 2006; Stephensons et al., 2006; Gage & Calixte, 2006; Magadi et al., 2003; Stephenson & Tsui, 2002,) and

PNC use (Ononokpono et al., 2013b; Babalola & Fatusi, 2009). These studies have gone beyond the effects of individual level variables to influence the use of reproductive health services by including community factors in their analysis. They place individual health seeking behaviour in a socio-economic context of communities and most of these studies were mainly conducted in the developed world. Knowledge on such studies, however, is still scarce.

The use of the multilevel approach has simplified a multivariate analysis that includes both micro-level variables and the macro-level variables simultaneously when examining the role of community influence on health outcomes (Pickett and Pearl, 2001). All the community characteristics mentioned in studies that included community factors in the analysis have strong influences on reproductive health care use even after controlling for individual-level factors. On the other hand, most of these studies that dealt with community effect ignored that the individual effect on reproductive health care service use might be compromised by some aspects of the community that may not be understood. As such, these studies fail to establish the independence of the community variables from the individual variables. Such independence has been established by other studies (Diez-Roux, 1998; 2001) which explains the significantly huge cluster variation that remains even after controlling for the effect of the individual characteristics. The unwavering relationship between contextual factors and health outcomes is demonstrated by these studies and they underline the importance of looking beyond individual and household-level factors when examining effects on health outcomes.

There is a gap in literature on how community-level quality of reproductive health care, barriers to health care access and socio-economic development is associated with adolescent reproductive health care utilisation. Some studies that examined community influences have focused on health service characteristics, and in particular, the quality of health care (Faye, Niane & Ba, 2011; Hamid & Stephenson, 2006; Sonenstein, Punja & Scarcella, 2004; RamaRao et a;., 2003; Sanoyo et al., 2003; Blanc, Curtis & Croft, 2002; Chack, 2001) and access to health care (Seiber & Betrand, 2003; Diez-Roux, 1998). Community-level socio-economic development has also been seen to influence the use of reproductive health care services (Aremu et al., 2011; Stephenson et al., 2008; Stephenson et al., 2007). These studies have demonstrated the importance of considering the importance of community-level effects on the use of reproductive health care. Most of

these studies however, have failed to acknowledge that some community characteristics operate through individual and household characteristics to influence reproductive health care service utilisation. Schreier & Chen (2013) assert that factors at different levels influence one another in dynamic ways that can alter how each then influences health behaviour. Their argument is that factors operate in more complex and bi-directional ways to influence health.

This thesis examines moderating effects of macro-level or contextual variables on the association between micro-level variables and reproductive health care utilisation by adolescent women in Zimbabwe. Macro-level variables involved included the quality of reproductive health care, barriers to health care access, and socio-economic development on reproductive health care. To date, there has not been a study that examines adolescent women's use of modern contraception, use of health facility for childbirth, and use PNC services in Zimbabwe beyond the role of individual and household influences.

This study posits that macro-level variables are more critical predictors of adolescent reproductive health care utilisation in Zimbabwe than micro-level variables. The study advances the understanding of the predictors of the use of reproductive health care services by adolescent women by including the role of community-level effects in the analysis. Results from this study can thus be harnessed to develop community-level health interventions. The study contributes to the development of rational and strategic policies aimed at increasing adolescent women's use of reproductive health care services in Southern Africa, as well as in the developing world at large.

1.3 Research Questions

The study focuses on three adolescent reproductive health care service outcomes; use of contraceptives, use of health facility for delivery, and use of PNC services. For each adolescent women health care service outcome, the general questions to be addressed are:

(1) What are the levels and determinants of reproductive health care service utilisation of adolescent women in Zimbabwe?

(2) To what extent is adolescent women's reproductive health care utilisation a function of quality to health care, barriers to health care access, and socio-economic development independent of the woman's socio-economic status in Zimbabwe?

(3) Do macro-level variables moderate the association between micro-level variables and adolescent women's reproductive health care utilisation?

(4) Does the overall contribution of macro-level variable effects on the use of modern contraceptives, health facility for delivery and PNC services by adolescent women outweigh the contribution by micro-level variable effects?

1.4 Research Objectives

1.4.1 General objective of the study

To investigate the individual, household and community determinants of utilisation of reproductive health care services by adolescent women in Zimbabwe.

1.4.2 Specific objectives

- To examine the levels of reproductive health care utilisation by adolescent women in Zimbabwe.
- To determine the association between micro-level variables and contraceptive use, utilisation of health facility for delivery, and PNC services by adolescent women in Zimbabwe
- To examine the independent effects of macro-level variables on contraceptive use, utilisation of health facility for delivery, and PNC services by adolescent women in Zimbabwe.
- To establish the moderating effects of the macro-level variables on the association between micro-level variables and contraceptive use, utilisation of health facility for delivery, and PNC by adolescent women in Zimbabwe.
- To compare the overall contribution of macro-level variables' effect on contraceptive use, utilisation of health facility for delivery, and PNC services by adolescent women with the contribution by micro-level and household variables' effects.

1.5 Definitions and Delimitations

Adolescent: Any person aged between 10 and 19 years but for this study, adolescent women refers to women aged 15 to 19 years because the Zimbabwean DHS does not go below the age of 15 years.

Modern Contraceptives: These include female sterilisation, the pill, the IUD, injectables, implants (such as Norplant), the male or female condom, diaphragm, lactational amenorrhoea method (LAM). Any other contraceptive method such as withdrawal and other traditional methods are not considered modern contraceptives.

Antenatal Care (ANC): The presentation of a pregnant woman at a health facility for medical examination (surveillance of diseases) during pregnancy (Also referred to as Prenatal Care).

Postnatal Care (PNC): Refers to the care of the mother and baby in the days and weeks following childbirth through physical examination and health monitoring. For this study, PNC refers to the first 48 hours after delivery of child. The first 48 hours are meant to look out for any signs of early postpartum complications, which is critical to the survival of the woman who has given birth.

Utilisation of Reproductive Health Care Services: Use of modern contraceptives, use of professional medical personnel for ANC, use of a health institution (facility) for childbirth, and with assistance by a trained medical personnel (use of the health institution for childbirth only for this study), as well as receipt of postpartum examination and counselling by women and their infants at the health institution (facility).

Community Level Variables: These are variables measured at the level of Provinces in Zimbabwe. Sample sizes for adolescent women at enumeration area level (EA) which are the primary sampling units (PSU) were too small to warrant predictability of the multilevel regression analysis parameters at PSU level.

1.6 Justification

The problems faced by adolescents are multidimensional in nature and require a holistic approach. Maternal mortality for Zimbabwe is still high and not showing signs of going down. The country has also witnessed a reversal of some reproductive health indicators, such as infant mortality ratio indicative of an inadequate health system (ZIMSTAT & ICF International Inc., 2012; CSO and Macro International, 2007). The already existing poverty in Zimbabwe coupled with inadequate health care systems compound adolescent vulnerability to sickness and death, as well as that of their infants. Development of base policies and programmes affecting adolescent use of reproductive health policies which are based on inadequate contextual-level evidence may hamper enhancement of adolescent women's maternal and reproductive health. It is important that such policies and programs are based on comprehensive understanding of the girth and complexity of factors that determine adolescent health seeking behaviour, thus bridging this programmatic research gap.

The study makes an important contribution to literature on the role of community influence on adolescent utilisation of reproductive health care services since such information is scant in developing countries, and more specifically in Southern African countries such as Zimbabwe. Adolescents constitute a considerable proportion of the population in Southern Africa and addressing their reproductive health needs is of public health significance when we consider the number of adolescents at risk of maternal death and reproductive morbidity, and the potential consequences both at household and community level. A specific focus on individual behaviour and personal responsibilities has a limited effect unless contextual influences at community level are also addressed.

This study allows for testing for more theories and revealing potential causal pathways involving macro-level variables. Moderating effects of contextual variables on the association between individual-level variables and health outcomes has often been ignored by several studies but this study would investigate such interactions. Simultaneous investigation of the effects of both the macro-level and micro-level variables is expected to provide important information. This information would enable policymakers not to look at adolescent utilisation of reproductive health care services in isolation, but also recognise the important contribution of contextual factors underlying adolescent utilisation of

reproductive health care services. The study provides adequate understanding of the relevant mechanism to design programmes for intervention in different settings.

1.7 Organisation of Thesis by Chapter

This thesis has a total of eleven chapters. It commences by discussing the background information to the study on Chapter 1. The chapter also provides the problem statement. This is followed by the research questions and research objectives (General and Specific). Definitions and delimitations follow the objectives of the study and lastly, the justification to the study is discussed. Chapter 2 provides a general overview of previous studies dealing with factors influencing utilisation of reproductive health care. The studies present a summary of the current state of research and knowledge on micro-level and macro-level determinants and their influences in shaping women's decisions to use or put to use reproductive health care services. The literature review section commences by providing an overview of adolescent sexual and reproductive health, followed by the discussion on utilisation of reproductive health care services by adolescents. The next section discusses determinants of utilisation of reproductive health services. Its starts by reviewing studies at global level, followed by a review of Sub Saharan studies and lastly studies on reproductive health utilisation in Zimbabwe. Deficiencies in existing literature are discussed and lastly, research questions and research objectives are stated.

Chapter 3 presents the theories and the conceptual models for this thesis. It commences by discussing the theoretical framework explaining health seeking behaviour. The Behavioural Models of Health Service Use (BMHSU) models are discussed here. The next sub-section discusses the conceptual framework for the study as adapted from Anderson (1995) and Wild and others (2010) models and modified to include community level influence on reproductive health utilisation. Lastly, the hypotheses for the study are specified. Chapter 4 presents the methodology used in this study. First, there is a discussion on study areas which is followed by the description of the data sources sampling process. The description of the dependent variables, macro-level variables, as well as micro-level variables (independent) to be examined in this study follows. The statistical analysis approach used in the study is explained as well and then this is followed

by a discussion on how the study objectives are met, followed by a discussion of ethical issues. Lastly, quality issues in the data are presented.

Chapter 5 discusses the samples that were used to analyse adolescent women's reproductive health care in Zimbabwe. Firstly, the section gives a brief description of the adolescent women aged 15 to 19 years, as well as the community-level characteristics for the study. The target population for the study is the adolescent women aged 15 to 19 years in Zimbabwe. This chapter begins by describing the selection of samples by type of reproductive health care service and then describes the background characteristics of samples of adolescent women by the three reproductive health care services outcomes being investigated. Lastly, community (provincial) level characteristics for the study are described.

Chapter 6 presents study results for the first and the second objectives of this study which examined the levels of reproductive health care utilisation by adolescent women in Zimbabwe and also determined the association between micro-level variables and contraceptive use, utilisation of health facility for delivery and postnatal care services by adolescent women in Zimbabwe. Chapter 7 presents the results answering the third and the fourth objectives of this study. The results are presented by reproductive health utilisation outcome. The chapter commences by presenting results on the independent effect of community level variables on adolescent women's use of modern contraceptives. This is followed by a presentation of results on the moderating effects of community level variables on modern contraceptive use. A similar approach is presented for use of health facility for delivery and PNC service use.

Chapter 8 presents results answering the fifth objective of this study. It commences by presenting results comparing the overall contribution of macro-level variable effect to adolescent women's modern contraceptive utilisation with the contribution by micro-level variable effects. Results on the comparison the overall contribution of macro level variable effects to use of health facility for delivery and PNC service use with the contribution by micro level individual and household effects then follow. Chapter 9 discusses the proposed study hypotheses on the basis of the study results. Each hypothesis is stated and then discussed in line with the findings of the study. In each case, explanations for confirmation or contradiction to the hypothesis by study results are provided. Chapter is then followed by Chapter 10 which discusses the study results. The

chapter begins by discussing results for objectives 1 and 2 of the study. This is then followed by a discussion of study results for the study objectives 3, 4 and 5. It finishes by discussing methodological issues which includes the strengths and limitations of the study.

Chapter 11 presents the conclusion and recommendations of the study. It commences by discussing the research conclusions and policy implications for the study by each reproductive health outcome. Thereafter, frontiers for further research are discussed. At the end of the thesis, references, appendices and annexures are presented.

CHAPTER 2: LITERATURE REVIEW

2.1 Overview of Adolescent Sexual and Reproductive Health

Adolescents go through physical, emotional and psychological changes which is often associated with consequences that require a public health response. This is a period of increased risk-taking and as a result adolescents are prone to behavioural problems, as well as sexual and reproductive health problems. Compared to their male counterparts, adolescent women face disproportionately higher levels of health problems during and after puberty mainly due to early pregnancy, and as a consequence due to early and frequent childbearing. They need support and care during this transition to adulthood. The sheer number of adolescents in the world and their proportion to the rest of the population especially in the developing world has become an issue of concern. Adolescents constitute about one fifth of the developing world and the health consequences of adolescents would take on massive proportions if neglected (Jejeebhoy, 1998). Adolescents are often disproportionately affected by social and economic inequities that characterise the development landscape and, as a result, suffer poor health outcomes. This study covers adolescent women as they suffer disproportionate reproductive health problems compared to other segments of the population.

Adolescents belong to the most active segment of populations and have practical concerns regarding negative reproductive health outcomes, such as unintended and premarital pregnancies, unsafe abortions, sexually transmitted infections (STIs) including HIV/AIDS, and preterm and unsafe deliveries. The reproductive health needs of adolescents are poorly understood and ill-served in SSA. According to Olukoya (2004), adolescents need an environment favourable to easy access of quality reproductive health care because this would significantly contribute to the reduction in the burden of maternal ill-health and death. Reduction of morbidity and mortality associated with sexual and reproductive behaviour is a required and expected public health response, and as such adolescents have become a focal point of discussions of sexuality and reproductive health matters.

The need to redress this situation through interventions becomes a reality due to the obvious implications of avoidable complications, namely morbidity and mortality.

Magadi et al (2007) paints a gloomy picture on the situation of adolescent pregnancy in Africa. Caution has been made by other experts on reproductive health as well and they advise that African governments and development partners should take immediate remedial action to address the grim picture of maternal and child health in the region.

Maternal mortality is the leading cause of death among young women in all low resource regions except for Eastern Asia. Those that are younger than 18 years of age have been found to be two to five times more likely to die from complications from pregnancy and childbirth, compared to older women (Lloyd, 2005). It is also estimated that approximately 14% (2.5 million) of all unsafe abortions in low resource countries occur in women younger than 20 years of age.

Occurrence of premarital and unintended births is more likely to take place among teenagers than older women. Singh et al (2005) found that young people engage in sexual activity very early and often in involuntary contexts. Young people's sexual behaviour is considered high risk, together with inadequate levels of means to protect their sexual health. They generally have no information to help them make choices and to engage in safe and health behaviours because they possess little or no knowledge on the risks to sexual health. They also do not have familiarity about the means of preventing unhealthy and undesired outcomes, (Singh et al., 2005) such as unwanted pregnancies. According to Marston and Cleland (2003) women who have premarital or unintended births are more likely to receive poor maternal health care. Eggleston (2000) confirms these results, and also found that women with unwanted pregnancies are less likely to receive prenatal care than women with planned pregnancies. SSA countries, and especially countries in Southern Africa, experience high levels of premarital teenage births. More than half of teenage births in Southern Africa are premarital and unintended. This makes adolescents (teenagers) a particular sub-group of concern, hence the need to improve access to reproductive health care services for adolescents.

Lloyd (2005) emphasises on investing in adolescents' sexual and reproductive health as this would accelerate the achievement of internationally agreed development goals, including MDGs. According to Lloyd (2005), such investments would go a long way in helping adolescent girls stay in school, marry later, delay childbearing, have healthier children, and earn better incomes. This would subsequently benefit adolescent girls in the long run, as well as their families and their communities.

2.2 Utilisation of Reproductive Health Care Services by Adolescents

Use of maternal health services is associated with improved maternal and neonatal health outcomes (Babalola and Fatusi, 2009). According to Gage (1998) and Magadi et al (2007), teenagers, who constitute a majority of the adolescents, are more likely to experience premarital and unintended births than older women. Premarital or unintended births are more likely to receive poorer maternal health care (Marston and Cleland, 2003). Most studies on the utilisation of reproductive health services in Southern Africa mainly focus on women in general (Chivonivoni et al., 2008; Tlebere et al., 2007; McGray, 2004; Stekelenburg et al., 2004; Chapman, 2003; Myer and Harrison, 2003; Nielsen et al., 2001). Studies that focused on adolescents have not adequately addressed what influenced adolescents to make more informed decisions on reproductive health care. Such studies addressed perceptions of health personnel (Chaibva et al., 2010) and youth-friendly appropriateness of services as factors that influence use of reproductive health services (Shaw, 2009; Erulkar et al., 2005; Mmari et al., 2003; Mashamba and Robson, 2002).

A study by Magadi et al (2007) examined the use of maternal health services by teenagers in 21 SSA countries and found little variation in maternal health care by age based on bivariate analysis. After controlling for background characteristics of women, teenagers were found to have poorer maternal health care than their older counterparts. There was no significant variation across countries in the SSA region, and hence the gap in terms of care, can be generalised in the region. According to Magadi et al (2007), the gap in maternal health care between teenagers with different characteristics is more pronounced in countries with relatively better maternal health care suggesting that the socio-economic disadvantaged subgroups may have benefitted least from improvements in maternal health care in such settings.

Generally, a high proportion of women in SSA have poor maternal health care (Abou-Zahr and Wardlaw, 2003). Abou-Zahr and Wardlaw (2003) declared that women in SSA initiate ANC late and found no association by maternal age. Magadi et al (2007), on the other hand, found that teenagers in SSA used ANC and delivery care services much less

than older women. Teenagers were found to be more likely to commence ANC late, make inadequate ANC visits during pregnancy, delivered outside health facilities, and had unskilled birth attendants at their births - compared to older women. A negative pregnancy outcome is associated with late initiation of ANC (Abou-Zahr and Wardlaw, 2003). Furthermore, the substantially low number of births attended by skilled health personnel is strongly correlated with high maternal mortality rates (Buor and Bream, 2004). Largely, both services and research have not adequately focused on adolescents, their health and information needs, and on what influences them to make more informed decisions on their reproductive health care.

2.3 Determinants of Utilisation of Reproductive Health Care Services

2.3.1 Global overview

2.3.1.1 Individual and Household Level Determinants

Extensive research has been done to understand factors influencing the use of reproductive health services, such as modern contraceptives, health facility for delivery and PNC. Globally, demographic, socio-economic, cultural, and psychosocial factors at individual level have been found to be associated with the utilisation of reproductive health services.

Maternal age is one demographic factor that has been found to be linked to the use of reproductive health care services. A cross-sectional study conducted in 2006 in Spain analysed inequalities in the use of contraceptives among women aged 15 to 49 years. This study revealed that age was significantly associated with the use of contraceptives among women in Spain. The level of education, country of origin, religion, age at first intercourse, cohabitation status, and number of children were also important individual demographic and socio-economic characteristics found to be related to contraceptive use (Ruiz-Munoz et al., 2011). In some studies, age has been found to be an accumulation of experience of the use of reproductive health services (Glei et al., 2003) and, on the other

hand, older women may be less likely to use modern facilities than younger women as older women may belong to more traditional cohorts (Navaneetham & Dharmalingam, 2002).

Birth order, or number of children, has also been found to be associated with reproductive health utilisation. A study carried out across different social settings in south India in 2002 investigated patterns and determinants of maternal health care use and found out that the likelihood of using maternal health care services was positively associated with a higher birth order. Reproductive, socio-economic, cultural and programme factors were also associated with maternal health care service utilisation (Navaneetham & Dharmalingam, 2002). A study conducted in the US among the non-pregnant Hispanic females between 13 and 25 years of age compared culturally relevant factors associated with contraceptive use. This study revealed that the number of children a woman has was a strong predictor of effective contraceptive use. Other important predictors included partner communication and acculturation level (Gillian et al., 2011).

Marital status has been found to influence utilisation of reproductive health services most likely through financial resources or due to the marital influence on female autonomy and status (Gabrysch & Campbell, 2009). In some societies, being a single woman is stigmatised and hence single women are more likely not to utilise reproductive health service due to fear of being ostracized by the society or health providers (Duong et al., 2004). Duong and others (2004) investigated factors influencing use of delivery services in rural Vietnam and found that single women preferred to deliver at home because they anticipated unpleasant health provider interaction.

Griffiths and Stephenson (2001) examined individual level influences on the decision to deliver a child in a health facility in two rural and urban areas in India. They demonstrated that maternal health care seeking behaviour is shaped by marital status which in turn may be shaped by culture. According to the study, when women perceive benefits of the service to outweigh the cost, socio-economic status of women was not found to be a barrier. Griffiths and Stephenson's findings regarding cost of services are consistent with findings by De Allegri and others (2011) in India. They found that a reduction of user-fees do not necessarily ensure that all women benefit from ANC services and from skilled attendance at birth. The same thing applies when the service was within a reasonable distance from the respondent's place of residence. Investments

in terms of providing health care facilities did not guarantee utilisation by women unless women recognise such investments to be helpful to their health and that of their unborn babies. In addition to the provision of health services, good quality services should motivate women to use them. It was also observed during the study by De Allegri and others (2011) that a number of respondents that received ANC went on to deliver at home, which may suggest that women were unsatisfied with services offered during ANC.

A woman's role in decision making within households comparative to her spouse and other family members may affect her use of reproductive health services. In India, Bloom et al (2001) examined the dimensions of women's, and their relationship to, maternal health care utilisation. The three areas examined included control over finances, decision-making powers, and freedom of movement. The study recognises the importance of education of women in influencing the use of reproductive health care services. Women with closer ties to biological relatives were found to have greater control over their finances, decision-making power, and freedom of movement. Higher levels of ANC were obtained by women with greater freedom of movement and additionally, were more likely to use safe delivery care. The effect of women's autonomy on utilisation of maternal health care was found to be largely independent of socio-demographic factors. The authors also recognise that women's autonomy is age related, as women become more autonomous as they age. This has been reiterated by Malhotra et al (1995) who indicate that adolescent women's autonomy is more than likely to become very limited. In most households, hierarchy of authority is usually managed by age and sex, with older people more than younger, and men more than women.

A study on the determinants of maternal health care in south India by Bhatia and Cleland (1995) confirmed the long established association between socio-economic factors and the use of maternal health care services declared by Obermeyer and Potter (1991). Obermeyer and Potter (1991) studied the use of maternal health care services in Jordan revealing a significant relationship between higher levels of education and greater use of ANC while larger numbers of children in the household and rural residence were associated with less use of ANC. In south India, high levels of maternal education, economic status, and urban residence were related to increased use of ANC, place of delivery as well as PNC services (Bhatia and Cleland, 1995). In Afghanistan, level of education was found to influence the use of modern contraception. Women with

secondary education or more were found to have a higher likelihood of modern contraceptive use than women with lower educational level (Rasooly, et al., 2015). Demographic factors were also found to play an important role in the use of ANC as women less than 18 years were found to be less likely to use ANC. Furthermore, first order pregnancies were more likely to receive ANC services. Personal hygiene and pregnancy order were only associated with ANC and natal care but not related to PNC showing imbalances between types of maternal health care services.

The economic status of women can have a profound effect on the decision to use health care services. Valdivia (2002) analysed the scale and nature of socio-economic variation in the utilisation of outpatient health care services in Peru. Large differences in the use of health care services were found between the rich and the poor. There was variation in the differences between the use of outpatient health care facilities by rural and urban regions. The difference in use between the rich and the poor seemed to be larger in rural areas than urban areas, even after controlling for socio-economic characteristics. The study also revealed that the expansion of a public network of public health facilities is necessary, but insufficient to promote equity in the use of health care services.

There are financial barriers that impact on making decisions to seek reproductive health services by adolescents. Young et al (1989) assessed reasons for delaying prenatal care among 11 to 19 year olds. Adolescents had financial and non-financial barriers to attending ANC. Financial barriers included inadequate health insurance, transportation costs and lack of finance for medical expenses. Non-financial barriers included lack of knowledge regarding the importance of ANC, fear of doctors and medical procedures and negative experiences during previous pregnancies. They also found that younger adolescents aged less than 18 years delayed seeking care because they were still concealing the pregnancy from parents. The fear for parental responses to the pregnancy seemed to supersede personal decision making regarding pregnancy. Those aged 18 to 19 had poor motivation to attend prenatal care.

Meuwissen et al. (2006) corroborated these findings in a quasi-experimental intervention study in Nicaragua, in which they evaluated a competitive voucher programme intended to make sexual and reproductive health care accessible to adolescents from disadvantageous areas. The voucher programme led to increased access to sexual and reproductive health care for poor and underserved adolescents. Adolescent

girls that did not receive vouchers had a significantly lower use of sexual and reproductive health care compared to voucher receivers.

Media represents one of the most powerful and less appreciated influences on health. It can have profound effect on women's decision to use reproductive health services (Strasburger, Jordan & Donnerstein, 2012). Studies on the effects of media attest to the potential power to produce positive changes in health related behaviours (Lou et al., 2012; Leask, Hooker & King, 2010; Wakefield, Loken & Honik, 2010). The use of maternal health service has been associated with being exposed to media (Sagna & Sunil, 2012). Whether media campaigns on health service use have been planned or not, media have been found to prompt changes in health service utilisation (Grilli, Ramsay & Minozzi, 2002).

Singh and others (2012) investigated factors associated with maternal health care services among married adolescents in rural India and found that utilisation of safe delivery, as well as use of PNC services was linked to exposure to media. A comparative study on utilisation of health services for delivery in South Asia and SSA also found a close association between institutional delivery and media exposure (Tey & Lai, 2013). The authors, however, suggested that the low media exposure among women in SSA and south Asia could also partly be linked to low educational levels and a shortage of media facilities.

Women have been found to have difficulties finding time for their health care, probably due to domestic responsibilities they are expected to perform. Such a complex situation was found in India by Nielsen and others (2001) where seeking time for health care is lost time for production related activities such as farming, fetching water, fetching wood for fuel, herding, trading and cooking. Furthermore, the study found that some women live in societies that forbid them to travel alone, and as such accessing reproductive health care can prove difficult for women if there is no one to accompany them. As they are always accompanied by other adults, their transport costs increase. Even then, women have to seek permission first in some instances. They do not always decide on their own to seek care or access health care (Nielsen et al., 2001).

There is relatively little published evidence on what determines client satisfaction among adolescents. Sovd and others (2006) investigated the characteristics of health care

service quality in Mongolia, as well as the correlation between adolescent client satisfaction and friendly health care services. Adequacy of the facility's physical environment, receipt of adequate information about the facility, and privacy of the facility were the strongest determinants to adolescent satisfaction. Thus. the study demonstrated the significance of understanding and quantifying various aspects of health service quality when defining client satisfaction.

In determining client satisfaction among adolescents in Mongolia, accessibility as in other studies (Glei et al., 2003) did not emerge as a critical factor as it had modest effects on a woman's decision to seek care. The findings from this study were not surprising because most of the literature emphasise changing the attitudes of health care providers as a priority (Transgrud, 1998; Benders, 1999; Ginsburg et al, 1995; Herz et al., 1988). A study on an adolescent friendly service programme in the United States indicated that the main reason for visiting a clinic was because it was a "teen only" clinic and the services were free (Transgrud, 1998). The cost factor in accessing services may be important for adolescents. Adolescents in Chicago (US) cited provider and staff attitude towards young people as the main factors for visiting a clinic (Herz et al., 1988). In any case, certain "adolescent-friendly" characteristics are a pre-requisite to ensure quality, effectiveness, and use of services by adolescents.

2.3.1.2 Community Level Determinants

Community-level factors influencing reproductive health care use have been carried out globally. A study in India examined the determinants of use of contraceptive services, ANC, medical institution delivery and services dealing with reproductive tract and sexually transmitted infections (Stephenson and Tsui, 2002). Using multi-level modelling, the study concludes that the use of the four mentioned services is largely shaped by socio-economic factors either at individual or household-level and availability of such services in a community has a strong influence as well. The likelihood of use of services for women with lower socio-economic indicators was consistently less than for those with better socio-economic indicators. Although the study highlighted important similarities in health seeking behaviour in determinants of the four services, important variations were found among service types. The magnitude of effects on each service use and the form they take varies by type of service. During this study, the level of effect by demographic factors on use of services dealing with reproductive tract and sexually

transmitted infections was much less than for use of contraceptive services, ANC and health facility delivery services. No community-level effects were established for use of ANC services, but there were strong community-level influences on use of other services. The study also demonstrated that the characteristics of the community in which the individual lives mediates the role of individual and households factors in determining use of services. The findings from this study exhibit the importance of the need to look beyond individual factors when examining health seeking behaviour. The authors stress that there is no outstanding community effect on the use of reproductive health services.

Household and neighbourhood living standards have been associated with use of reproductive health services. Montgomery and Hewlett (2005) used DHS data from 85 cities in 50 resource-poor countries to investigate whether household and neighbourhood living standards influenced the health of urban women and children in poor countries. Using multivariate analysis models and modelling living standards using factor-analytic MIMIC methods, household living standards were found to be closely associated with unmet need for contraception and attendance of a trained health care provider during child birth. In many of the surveys examined, neighbourhood living standards were found to be exerting a significant additional influence especially on birth attendance.

Kirby and Kaneda (2005) also examined how neighbourhood socio-economic disadvantage is associated with health care access. They found that neighbourhood socio-economic disadvantage reduced the likelihood of having a usual source of health care and obtaining preventive care services. It was found to also increase chances of having unmet medical need.

Gage and Calixte (2006) demonstrated the importance of improving the availability of services, road conditions, and a reduction in poverty in order to improve the use of maternal health care services in rural Haiti. The authors found the presence of a health worker providing ANC in the neighbourhood to have positive effects on a woman's decision to use maternal health care services. Poor roads and mountainous terrain were also found to have a negative effect on use. The presence of a health worker also increased the odds of being attended to by trained medical personnel at delivery. The availability of a health centre within 5 kilometres was associated to some extent with higher prevalence of assisted delivery by trained medical personnel and of delivery in health facilities. Long distances was not associated with use of ANC services, but was significantly related to

increased inequities in the use made of health services for care during childbirth. The mountainous terrain appreciably diminished the odds of being attended by trained medical personnel and of institutional delivery in rural Haiti (Gage & Calixte, 2006). These findings are consistent with those from Stephenson and Tsui (2002, 2003). In contrast, Glei and others (2003) found that availability and access to health facilities had a modest effect on the use of health facilities in Guatemala. Concentration of poverty was another significant variable that had a strong persistent association with use of maternal health care services.

Another study that found a positive effect of availability and accessibility of health facility on use of maternal health care services was conducted in rural India by Sunil and others (2006). The study was meant to have a theoretical understanding of the effects of individual and programme factors in the use of maternal care services in rural India. They concluded that individual characteristics, and programme and system factors influence the use of maternal care in rural India. Availability and accessibility of health services were some of the programme factors considered. Other programme areas included Information, Education and Communication (IEC) activities at community level and visitation by health worker during pregnancy.

The effect of media saturation at community level has been found to influence utilisation of maternal health service. In Haiti, a study was conducted to assess factors associated with utilisation of antenatal services and skilled birth attendance among women giving birth in Haiti from 2007 to 2012. The study revealed that utilisation increased with an increase in community media saturation (Babalola, 2014). The author concluded that use of maternal health services operated at multiple levels and it is necessary to design community based mobilization efforts to change norms hindering the use of maternal health services are relevant.

A bad experience with a previous pregnancy by women can have an influence on the woman's decision to use the maternal health care services. Glei and others (2003) examined factors associated with the use of biomedical care during pregnancy in Guatemala. Using multilevel models, the authors focused on the extent to which complications in an on-going or previous pregnancy affect a woman's decision to seek biomedical care. Important predictors suggested by the study were the obstetric need for care, demographic, social and cultural factors. The strongest predictors of whether a

woman receives biomedical care during pregnancy were ethnicity and educational attainment. Other important predisposing factors included parity, health beliefs, marital status, and women's autonomy in household decision making. According to the authors, many of the results from the study were consistent with results from previous research, but they also reveal unexpected and important result. Unlike in other studies, the availability of private physicians, government sponsored health facilities, accessibility to these services, and the family's ability to afford these services had little effect on the women's decisions to use them. Family's income did not have any association with use of biomedical services. The authors suggested the significance of unobserved variables such as quality of care in explaining women's decisions about pregnancy care. They also cast doubt on the dramatic impact of improving proximity of health care services on utilisation without additional changes that improves the quality of care or reducing barriers to access. They suggest the provision of culturally appropriate, high quality services by traditional and biomedical providers alike.

2.3.2 Sub-Saharan Africa overview

2.3.2.1 Individual and Household Level Determinants

Studies on individual and household-level determinants of reproductive health care service utilisation carried out in SSA have also identified similar demographic, socio-economic, cultural and psychosocial factors associated with utilisation of service. For example, maternal age has been found to be consistently associated with use of maternal health care service utilisation (Letamo & Rakgoasi, 2003; Mwaniki, Kabiru & Mbugua, 2002). Letamo and Rakgoasi (2003) investigated individual and household factors associated with non-use of maternal health service in Botswana. They found that teenagers were less likely to seek ANC and PNC services than older women. They were also found to be more likely not to use skilled attendance during birth. In Kenya, Mwaniki and others (2002) carried a cross-sectional descriptive study to determine utilisation of ANC and maternity services by mothers who have brought their children to the Child Welfare Clinic in Mbeere District. They found that the age of the mother influenced utilisation of maternity services. Generally, adolescent women often have limited control over their use of reproductive health services. There is evidence to indicate that the decision to use modern contraceptives by adolescent women is made by others other than

themselves (UNFPA & Guttmacher, 2009). The social pressures to bear children especially in Sub-Saharan African countries increase adolescent vulnerability as they are subjected to sexual exploitation and abuse, and may have limited ability to protect their health (UNICEF, 2011) - including the use of reproductive health care services.

Women residing in urban areas have been found to be more likely to use maternal health care services as compared to rural women. Zere and others (2011) carried out a study in Namibia to identify drivers of wealth related inequalities in child delivery by skilled health personnel. The study revealed that women in urban areas accessed services by skilled birth attendants more than in rural areas. The authors also pointed out that poverty may be linked to the urban and rural status of women, and might be the explanation for disparities in the use of maternal health care services than the urban/rural residence status. Another study carried out to establish a better understanding of the relevance of religion in maternal health care service utilisation in Ghana found that disparities in the use of maternal health care services in Ghana were also explained by rural-urban differentials (Gyimah, Takyi & Addai, 2006).

In 2006, a study carried out to identify factors influencing choice of delivery place by pregnant women in Enugu, South-eastern Nigeria found that place of residence was statistically associated with choice of place of delivery. In Botswana, Letamo & Rakgoasi (2003) found a consistent link between urban residence and maternal health service use such as antenatal care, institutional delivery, skilled birth attendance and postnatal care. A similar relationship between place of residence and maternal health service utilisation was also found in Ethiopia (Meckonnen & Meckonnen, 2003). In developing countries, there are differentials in access to the nearest health facilities by place of residence. Health facilities are more likely to be inaccessible in rural areas than in urban areas. Large distances to, or inaccessible, health facilities are more likely to increase chances of a woman's delivery with assistance by a traditional birth attendant or a female relative, compared to a trained midwife.

Demographic factors, such as marital status, can shape maternal health care seeking behaviour. A cross-sectional study using both quantitative and qualitative techniques was carried out in Kalabo district, Zambia to determine the level of use of maternal health care services and to identify and assess factors that influence women's choices on where to deliver (Stekelenburg et al., 2004). Although more than nine in ten women preferred to

deliver in a health facility, a little less than two thirds actually did. Individual-level factors associated with women's likelihood of use of health facility for delivery included unmarried women, highly educated women, women with formal employment, women who are able to pay user fees and those that live near the clinic. Women with higher education, with formal employment, and those that are unmarried were said to make their own decisions and as a result were more likely to deliver in a clinic. According to Stekelenburg et al. (2004), the study confirmed assumptions concerning women's status and the decision to use maternal health care services which is strongly influenced by the economic and social dimensions of the distribution of power between spouses. Lack of transport, lack of user fees, lack of adequate education during ANC, and poorly staffed and ill-equipped institutions with poorly skilled personnel were some of the reasons cited as contributing to non-use of health facility for delivery. It is argued that these factors cause delays in seeking health care. Such delays, coupled with poor accessibility and sub-standard care factors at health institutions are identified as possible reasons to blame for low use of health institutions and high maternal mortality.

Married adolescent girls in the developing world lack autonomy, and this has negative health implications (Jejeebhoy, 1998). The situation is dire in Africa, where young married adolescents lack autonomy to make decisions about their health within the household. There is a culture of silence surrounding sexual and reproductive health issues in Africa. This state of affairs, coupled with widespread seclusion of young girls make adolescents vulnerable to avoidable negative reproductive health outcomes. Such adolescents are unlikely to seek or obtain reproductive health information or care including ANC and delivery services - unless they are given permission (Jejeebhouy, 1998). Another study in Ghana also found that married adolescent women in Ghana were less likely to use contraceptives compared to their unmarried peers (Marrone et al., 2014). The study explored key socio-demographic factors associated with associated with contraceptive use among adolescent girls in Ghana using the 2008 Ghana Demographic and Health Survey data. The study also revealed that adolescent girls in rural areas were less likely to use modern contraceptives.

Adamu and Saliku (2002) investigated socio-cultural and economic factors that act as barriers to women's use of ANC services and hospital delivery in a rural community in Kano state, Nigeria. A majority of women did not attend ANC, and more than nine in ten

women delivered or planned to deliver at home. Barriers to the use of ANC and hospital delivery were economic, cultural and those related to the women's perception of their reproductive health condition. Financial reasons accounted for almost half of the women interviewed not accessing service, as most women or communities in rural areas depend exclusively on their husband's income for livelihood. The authors assert that ANC is regarded as a luxury, and women may not go out without the husband's permission unless it is an extreme emergency. The study also reveals that women have fatalistic tendencies with regard to their reproductive health as they leave their fate and helplessness to "God". Hospital deliveries are only needed when it is perceived to be necessary and there is a preference for traditional childbirth practices.

Economic reasons may also act as a driving force towards use of other alternative reproductive health services, other than biomedical. Adamu and Saliku (2002) indicated that women disliked certain practices associated with hospital delivery and they would rather have a home delivery to avoid such inconveniences, namely the costs involved and transportation difficulties. In some African contexts, the attitudinal beliefs towards delivery sites become important in shaping women's decision to seek care at health facilities. According to Amooti-Kaguna and Nuwara (2000), these beliefs may be shaped by self-efficacy of women, the social influence from the spouse, relatives, traditional birth attendants, and health workers and as such, some prefer home delivery with assistance from traditional birth attendants. The authors also asserted that traditional birth attendants have more roles than trained medical personnel as they also offer herbs to make the baby grow well, cleanse the birth canal, treat and prevent sexually transmitted infections and abnormal vaginal discharges, and softening "bones" as pregnancy progresses. Not only do traditional birth attendants assist in treating sick children but also provide ANC, PNC, and treat infertility. In some cases, services by traditional birth attendants are free of charge, flexible, or payment is negotiated, including credit.

A case study from rural Burkina Faso identified determinants of utilisation for ANC and skilled attendance at birth after a substantial reduction of user fees. De Allegri and others (2011) argued that although user fee easing secured equitable access to care across socio-economic groups, health investment policies should address barriers beyond financial ones.

Women's education attainment has consistently been found to have a positive influence on utilisation of health care services in several studies. Caldwell (1986) believed that more education resulted in part from better allocation of financial and other resources, greater control over resources, more autonomy in household decision making, greater self-confidence and stronger demand for health practitioners. A comparative analysis by Magadi, Agwanda and Obare (2007) on the use of maternal health care services between teenagers and older mothers in SSA linked greater education to higher levels of maternal health service. Letamo and Rakgoasi (2003) also found that women with low educational levels were less likely to seek ANC, to seek skilled birth attendance and to seek PNC. A study by van den Broek et al (2003) assessed the effects of women's education in a rural community in southern Malawi on pregnancy outcomes, maternal mortality, and health seeking behaviour. The authors found that an increase in education increased chances of assistance at delivery by a trained health care worker and ultimately improved pregnancy outcome. A study carried out in rural Ghana by Addai (2000) also found a similar relationship.

A cross-sectional study carried out in Ethiopia to assess determinants of maternal care utilisation found that the likelihood of attending ANC was four times higher for women who were exposed to radio or television than for those that did not. Those exposed were almost three times more likely to have skilled delivery care (Birmeta, Dibaba & Woldeyohannes, 2013).

Religious denominational affiliation has also been found to have an impact on maternal health care utilisation. Gyimah et al. (2006) investigated the significance of religion of maternal health utilisation in Ghana. The authors explored connections between macro-structural processes, in this case religion, and its impact on programmes aimed at improving maternal and child health in Ghana since any progress in improving maternal child health will require a concerted effort by policy and non-policy makers. The study found religion to be a significant factor in maternal health care use in Ghana even after controlling for socio-economic variables. Muslims and those affiliated to African Traditional religions were more likely not to use maternal health care services as compared to Christians. This study has shown that the provision of good medical services alone is not enough for the delivery of better health care. Such efforts need to also take into account other structural processes, such as religious orientation and beliefs. The view

that religious differences in maternal health service utilisation mainly reflect the socio-economic disparities has been challenged by the findings from this study. The effect of being a traditionalist on maternal health utilisation was strong, but it was significantly reduced after controlling for socio-economic variables suggesting that even though it partly affects maternal health use through other factors, it still remains important. Another study in Ghana which investigated factors determining the timing of antenatal visits and the type of delivery among a national representative sample of Ghanaian women also found that religion played a significant role in influencing utilisation of antennal are service (Doku et al., 2012).

Culture has an effect in shaping women's decision to seek health care services. Cultural preferences for alternative treatment, pregnancy risk perceptions, and differences in local physiological and anatomical concepts of reproduction, as well as biomedical provider models are important factors that may influence the decision of women to use health care services. A study by Kyomuhendo (2003) in Uganda indicated that adherence to traditional birthing practices is one of the reasons why women faced with complications of pregnancy or delivery continue to choose high risk options leading to severe morbidity and even their own death. The findings also point out that use of health facility is considered as a last option. There are beliefs that pregnancy is a test of endurance and maternal death a sad but normal event and as such maternal mortality is explained as "she fell on the battlefield in the line of duty" hence it is conceptualized as "the woman's battle". Use of ANC services is only sought when women experience symptoms of complications (Kyomuhendo, 2003). During the study, issues of the effect of women's lack of autonomy in seeking health care services at household level were revealed. Women have to negotiate with husbands for money to pay for visits, which end in quarrels in some instances, and sometimes without success. Other aspects of perceived quality of health service such as lack of skilled staff at Primary health care level, complaints of abuse, neglect and unsatisfactory treatment in hospitals and poorly understood reasons for procedures also surfaced.

Fear of witchcraft is one cultural matter that has been found to have an effect in women's ability to either seek or not seek reproductive health care. Chapman (2003) carried out an ethnographic research to examine pregnant women's underutilisation of clinic based prenatal care services in Mozambique where women have an immense

pressure to bear children throughout their reproductive years. Women reported being vulnerable to high levels of maternal morbidity and frequent pregnancy wastage during study. Chapman (2003) asserts that women's reproductive susceptibility is made worse by poverty and intense burden placed on poor, peri-urban women farmers for family subsistence and continuous fertility in a period of economic austerity, land shortages, and increasing social conflict and inequality. Women in Mozambique live in an economically insecure environment exacerbated by harsh living conditions and as a result, they compete for scarce resources which include competition for male support and income. Consequently, women hide their pregnancies and delay prenatal care because they have a perception that witchcraft and sorcery by jealous neighbours and kin, whom they believe may target them and their unborn infants due to their reproductive vulnerability. This can be seen as a strategy to protect pregnancy from purposeful human and spirit harm and it is such perceived defencelessness that prevents women from using reproductive health services. According to Chapman (2003), women would alternatively seek protective and curative therapies from informal health providers because of their capability of dealing with women's experiences of reproductive susceptibility entrenched in shattered social relations and poverty.

Travel patterns for health access for reproductive health issues have also been seen to be shaped by cultural roles of women. The culture and the environment in which women live may have an effect on utilisation of reproductive health services. Domestic water reticulation in most rural areas of developing countries, especially in Africa is poor and people have to travel some distance to fetch water for domestic use. McGray (2004) carried out a study in a rural northern area in KwaZulu Natal, South Africa to understand the temporal and spatial factors that affect utilisation of health facilities for ANC by rural women in South Africa. The study revealed that women in rural areas spent time attending to essential tasks that the entire family dependent upon such as fetching water. Whilst fetching water has usually not been associated with ANC, it was found to have significant effect on utilisation of ANC. The findings also noted that tasks allocated to women by their culture involved much travel but since most women do not have access to private vehicles, they have to walk or rely on public transport which may be limited or not exist (Mahapa and Mashiri, 2001).

According to McGray (2004), childcare was not a significant factor associated with how well a woman utilised ANC. Other factors that did not have a significant effect on the utilisation rate were age, parity, and wealth and transport mode. The study highlights the impact distance to the nearest health facility can have on utilisation of ANC. It also demonstrates how daily household responsibilities for women can exacerbate the negative impact of distance on ANC utilisation. It should be noted here that it is particularly younger women that carry out most of these tasks. This study contributes to understanding multifaceted factors that encourage or discourage rural women from travelling to health care facilities to seek reproductive health care.

In South Africa, a community-based study by Tlebere and others (2007) explored factors that impact utilisation of maternal health services and highlighted family and community issues in relation to maternal and newborn care. Transport related problems and distance to care was the most important factor that inhibited utilisation of maternal health care services in South Africa. This problem is more pronounced in the rural areas. Unlike in other sub-Saharan African countires, the health seeking behaviour was found to be better than anticipated. The study also draws attention to health service related issues that inhibited maternal health care service use such as poor communication with families by the health providers, mistreatment by health providers and doubts with the quality of care. HIV/AIDS was found to be a major issue that contributed to maternal mortality. The study also identified families and the community as untapped resources that could be utilised for improvement of maternal and neonatal care.

Knowledge constraints to using maternal health care was also highlighted in a survey conducted in a rural district of Bla in Mali (Smith et al., 2004). The study investigated knowledge, attitudes and practices related to maternal health care among women of reproductive age and corresponding household heads. There were considerable inconsistencies revealed between perceived importance of ANC, institutional delivery and PNC, and actual utilisation among women in Bla. General knowledge of the importance of use of these maternal care services was high. Reasons that impeded use of these services included lack of need and costs related to visits. Primary decision makers regarding pregnancy related care for women in this study were mainly household heads and husbands who surprisingly held similar perceptions of and knowledge about maternal health care. This implies that health seeking behaviour is a function of the hierarchy of

decision making power within households. The study revealed that women do not regard ANC, institutional delivery and PNC with the same level of importance. According to the authors, ANC and institutional delivery were regarded as more important than PNC to the health of the mother and newborn. This may also have to do with access to reproductive health care about the importance of ANC, delivery and PNC. Smith and others (2004) indicated that three quarters of women in the study have heard messages that focused on the importance of prenatal consultations whereas a few did receive messages relating to delivery and PNC.

Perceptions about the danger of pregnancy may also contribute to non-use or late use of maternal health care. In a study that investigated factors that shaped utilisation of ANC in South Africa (Myer and Harrison, 2003), most women did not perceive health threat during pregnancy and as a result view more than one ANC visit as unnecessary. On the other hand, women prefer to give birth at a health facility as they perceive labour and pregnancy as a time of significant health risks that necessitate use of biomedical care. A first visit to the health facility to seek ANC is necessitated by the need to get an ANC attendance card which is needed for delivery at the health facility.

Patient satisfaction is an important and desired outcome of health care encounters (Coulter and Fitzpatrick, 2000). Satisfied clients make repeat visits, produce positive word of mouth communication and become loyal to the service. There have been attempts in Southern Africa to introduce adolescent friendly service programs to increase access to reproductive health care to adolescents. Such opportunities provide information and counselling services on sexual and reproductive health matters (Jejeebhoy, 1998). However, most of these services are concentrated in large urban areas whereas about two thirds of adolescents in Southern African countries live in rural areas. Even then, accessibility to such services requires that they be acceptable to adolescents. A study in Zambia evaluated the impact of the youth friendly service projects in Lusaka, Zambia (Mmari and Magnani, 2003). The projects, which were clinic based, were meant to increase service use of reproductive health services among adolescents. Results indicate that the projects seemed to have improved the clinic experience for adolescent clients and to have increased use levels at some clinics. The main pitfall of the study was its inability to control for unobserved variations among clinics that may have influenced some clinics to attract more adolescent clients than others. In addition, unobserved community-level

factors that may have prompted youth to utilise services in some communities could not be controlled. The study, however, suggests that community acceptance of reproductive health services for youth may have a larger impact on the health seeking behaviour of adolescents.

2.3.2.2.Community Level Determinants

Studies on the importance of community-level influence on utilisation of reproductive health care services have just recently gained momentum in SSA. A study to examine whether the urban poor experience comparable disadvantages in maternal health care was conducted using DHS data from 23 countries in SSA (Magadi et al., 2003). The study demonstrates the importance of high neighbourhood living standards in influencing receipt of maternal health care by women. The findings indicate that urban poor received better ANC and delivery care than the poor in rural areas. The authors, however, suggest that the allocation of health services in Africa does not benefit the urban poor as care provided to the urban poor is worse than that of the urban non-poor. The urban non-poor were less likely to initiate ANC late in pregnancy, make fewer ANC visits to a health facility, and receive non-professional delivery care than the urban poor. Using multilevel modelling, the study depicted significant variations in maternal health in urban areas across countries of SSA. Surprisingly, these variations were not uniform across the countries. According to authors, the difference in health care for the urban poor is particularly more pronounced in areas where there is relatively better maternal health care suggesting that the urban poor benefit least from improvements in maternal health care.

Effects of neighbourhood socio-economic disadvantage on health care utilisation were also demonstrated by a study carried out by Aremu, Lawoko and Dalal (2011) in Nigeria. Using multilevel discrete choice analysis modelling, the study revealed a linkage between residing in high socio-economic disadvantaged neighbourhoods and giving birth at home by women. Patronage of government health institutions was associated with low socio-economic disadvantage neighbourhoods. Individual-level factors associated with home delivery were high birth order and young maternal age whereas high wealth status, having an occupation, high level of education attainment, and possession of health insurance were associated with institutional delivery.

High national literacy level is a good indicator of socio-economic development and a high female literacy level may have considerable influence on use of reproductive health care services. According to McTavish and others (2010), higher national levels of female literacy may reduce income related inequalities in use of maternal health care. The authors examined the importance of national female literacy on women's maternal health care use in sub-Saharan Africa and revealed that individual age, education, urban residence and household income were associated with use of maternal health care within countries. They also observed that the association of household income with lack of maternal health care use was modified by national female literacy and that the strength of the association was found to be weaker in countries with a relatively higher national female literacy.

Gage (2007) examined area and individual-level barriers to utilisation of maternal health services in rural Mali using the multilevel modelling approach. He revealed a range of area level influences on the use of maternal health services in rural Mali. The use of maternal health care services during the first trimester was influenced by availability of health facilities while transportation was an important factor that influenced use of ANC for four or more times. Distance from the health facility was a significant barrier for delivery at the health facility and delivery assistance by trained medical personnel. There was contextual influence in the use of maternal health services because women's odds of using antenatal care during the first trimester and for more than four times during pregnancy, institutional delivery and delivery assistance by a trained medical personnel were strongly influenced by the practices of others in areas of residence, and by living in close propinquity to people with secondary or higher education. Although household poverty and personal problems were negatively related to use of ANC, institutional delivery and delivery assistance, the area level factors explained a greater proportion of the variation in delivery care than ANC.

A high mean number of children per woman at community level may indicate traditional community pro-natalist attitudes. It is not uncommon to find large numbers of children in households where the mean number of children per woman is high. Large numbers of children in households are usually associated with low levels of use of maternal services (Obermeyer and Potter, 1991). A high mean number of children per woman in the community was found to influence women's decision to use maternal health care facilities for child birth in Africa (Stephensons et al., 2006). A study by Stephenson

and others (2006) used data from six African countries to examine community-level influences on the decision to deliver a child using multilevel model analysis. The mean number of children was used as a measure of both the presence of services and the community attitudes towards the use of health services. The high number of children per woman in a community was found to be a depressing influence on a woman's choice of delivering in a health facility due to more traditional attitudes of communities with high fertility towards health service use. Such communities are more likely to have lower socio-economic development as well as expected conservative traditional roles for women which ultimately influence a woman's ability to seek care during labour.

A high level of fertility in a community may reflect a lack of reproductive health services or lack of awareness of their existence which may have an effect on use. According to Stephenson and others (2006), the high percentage of women who delivered their child in a health facility was related to use of maternal health care services which the authors indicate may be reflective of the presence of the maternal health care services in the community. Generally, the findings for the six African settings indicate that the community plays an important role in shaping individual health behaviours. There were strong community-level influences on a woman's decision to deliver her child in a health facility in all the countries that participated. The study identified several pathways of influence between the community and the individual. For example, the practices of others within the community, such as delivering in a health facility, may be seen as a norm, ultimately influencing individual behaviour. Community-level variables identified, that exerted influence on a woman's decision to seek care during labour, were surprisingly similar across all countries and these included socio-economic development, female autonomy and fertility norms. The authors suggest that there is need to examine the local context since there was sufficient variation in the significant community level variables.

Several studies have demonstrated that availability and accessibility of health services influence decision by women to utilise them. A study by Magadi and others (2000) examined variations in the use of ANC services by women in Kenya using a three level linear regression model. The study found availability and accessibility of health care services, as well as desirability of pregnancy important factors influencing use of maternal health care services. Whilst proximity to maternal health services encouraged women to seek care, long distance was on the other hand found to be an obstacle to receiving

adequate care. The high intra-correlation at woman level on use of ANC established during the study suggests that even when health services are within easy access, some women were more likely to use them whilst others are less likely.

In a study in Kenya by Magadi and others (2000), women residing in urban areas were found to use maternal health services more than their rural counterparts. Socio-economic status of the household measured by household amenities and possessions was found to be an important factor influencing use of maternal services. Employment status, marital status and ethnicity were also found to be important predictors. Maternal education was found to be associated with maternal health care use in the bivariate analysis but was surprisingly not found to be associated with maternal health service use during the multivariate analysis. Reproductive factors found in women who were more likely to seek appropriate maternal services were higher parity, large family desire, early childbearing and non-use of modern family planning methods. The authors indicated that if a pregnancy is mistimed or unplanned, then women are more likely to deviate from their normal pattern.

2.3.3 Overview of Zimbabwean studies

2.3.3.1 Individual and Household Level Determinants

Zimbabwe remains one of the countries in SSA which have not made sufficient progress in improving maternal health. The maternal mortality ratio was estimated at 520 deaths per 100 000 live births in 1990 and it increased to 550, 680 and 740 by 1995, 2000 and 2005 respectively. The ratio has been reduced to 470 by 2013 (WHO, 2014). However, reproductive health service utilisation remains poor among women in Zimbabwe. Studies on factors influencing utilisation of reproductive health services in Zimbabwe are limited. Most of these studies have focused on contraceptive use and very few focused on antenatal care, use of health facility for delivery and postnatal care service use.

Zimbabwe has witnessed a continued rise in the uptake of contraceptives since independence, even when it was going though serious socio-political, economic and

health challenges. This was mainly due to the solid foundation put on the family planning programme (Mturi & Joshua, 2011). Utilisation of modern contraceptives however still remains low. Jayne and Guilkey (1998) investigated determinants of contraceptive use in three countries including Zimbabwe and found that women's education was an important determinant of modern contraceptive use. However, access to fixed health facilities was not found to have influence but rather, the presence of a community-based health worker was found to be an important determinant. A prospective intervention study on post-abortion family planning in two cities of Harare and Bulawayo found that health services related factors such as the availability of ward based contraceptive services provided to women treated for incomplete abortion can significantly reduce subsequent pregnancies (Johnson et al., 2002).

In a study that examined factors associated with unmet need and demand for family planning in Zimbabwe between 1994 and 2006, Magure and others (2010) found that higher levels of contraceptive use was associated with higher levels of education, higher household wealth quintile and working outside home. Unmet need for family planning was highest among the never married sexually active women, adolescents, uneducated women, poor women, nulliparious, and women from the two Matebeleland provinces.

Although several studies investigated utilisation of contraceptives in general, some focused on condom use, both male and female, mainly as an effort to inform HIV preventive strategies in Zimbabwe. The high level of maternal mortality in Zimbabwe co-existed with the high levels of HIV prevalence among women of the childbearing ages and as a result, there was much emphasis on intervention strategies aimed at reducing the impact of the HIV epidemic. Moyo (2002) examined predictors of condom use in a population based sample of ever married women in Zimbabwe and found that use of condom was high for those who had sex with boyfriend compared to those who had sex with husband. Other predictors of use included being separated or divorced, having secondary or higher education and having a high self-perceived risk for HIV infection.

Adetunji and Meekers (2001) investigated the extent to which sexually active adults consistently used condoms in high risk sexual situations and found that in non-marital relationships, consistent condom use was significantly higher for males. The authors also revealed that consistent use was higher for those who were aware of the efficacy of the

condoms, who had access to information about condoms and for those with positive attitude to condoms.

In a study that investigated the risk and resilient factors on adolescent's condom use in Zimbabwe, Betts et al. (2003) found age and gender differentials in condom use. Older boys were more likely to engage in safer sex as compared to younger boys. Other factors that were associated with safe sex among boys was being more likely to report presence of parent when needed and spending more time in extracurricular activities. Girls who were more likely to engage in safer sex were more worried about HIV/AIDS than those who engaged in riskier encounters. In a study that compared views about abstinence and condom use by young people in Zimbabwe, Ravai and others (2003) revealed that the decision to abstain or use a condom may not necessarily indicate genuine individual choices but rather their deference to adult interest. As a result, adolescents do conceal their use of condoms in order not to disappoint adults.

Hindin (2000) investigated women's autonomy and status in Zimbabwe and found that women believed that childbearing and contraception decisions should be determined by their husbands. The co-existence of this social environment with the high HIV prevalence promoted the need to introduce the female condom which empowered women to use contraceptives. As a result, several studies examined factors influencing use of female condom. Kerrigan et al (2000) carried a descriptive cross-sectional study to understand the patterns and dynamics of female condom use and found that the female condom was used for novelty or experimentation. It was also used to prevent pregnancy as well as for STI and HIV prevention. Meekers and Richter (2005) investigated factors associated with the use of female condom in Zimbabwe and found that women found the female condom easy to use, affordable, and effective in STI and HIV prevention. The female condom was also used to prevent pregnancy.

In a study that investigated the perception and acceptability of the female condom in rural areas of Zimbabwe, Francis-Chizororo and Natshalaga (2003) found that very few women had used a female condom. The authors found that younger women were more likely to use the female condom that their older counterparts. The study revealed that women indicated that it would be difficult to introduce the female condom in married situations due to the stigma attached to the use of condom in general. This reiterated findings by Ray et al (1995) who found that the female condom was mainly used for

Sexually Transmitted Infections and HIV prevention, and the reasons for use by women who liked it were male-centred. Napierala et al. (2008), on the other hand, noted an increase in the uptake of the female condom among women in Zimbabwe and reported that women believed that they could use the female condom more consistently than the male condom.

The use of ANC in Zimbabwe was relatively high when compared to other countries in the Sub-Saharan region (ZIMSTAT & ICF International Inc., 2012). However, there still remain a substantial proportion of women who still prefer not to use the ANC services. In a qualitative study of women's perspectives and experiences of women in their use of ANC, Mathole et al. (2004) noted that women maternal seeking behaviour was divergent to the professionally accepted behaviour. The behaviours were dissimilar between younger women and older women as younger women preferred shorter spaced ANC visits whereas older women were generally not concerned with the ANC visits. The authors argued that cultural beliefs had great influences when pregnancies are acknowledged and reported. The authors noted that women believe that pregnant women are vulnerable to witchcraft especially during the early period of pregnancy.

Chaibva et al. (2010) examined factors explaining adolescent's utilisation of antenatal services during their pregnancy in the city of Bulawayo from the midwives' perspective. Major factors mentioned included transport costs and charges for prenatal services. The study also revealed that adolescent's utilisation of ANC services could be influenced by demographic factors such as age, parity, and marital status. The authors indicated that the lack of knowledge on benefits of antenatal care by adolescents could be deterring adolescent women from antenatal services. Service related factors such as the quality, accessibility and affordability of antenatal care services were also mentioned as factors that could influence utilisation of antenatal care service by adolescents.

In another study that examined factors influencing adolescents' non-utilisation of ANC services in Bulawayo, Chaibva and others (2009) found that the unemployed, single and economically dependent women were less likely to utilise ANC services. Adolescent women were found to have individual perception about ANC services, which hindered them from using the services. The authors also found that adolescents had limited knowledge and misconceptions about ANC services. The findings also indicate that antenatal care services were perceived to be of poor quality hence would not benefit them

and their babies. The study revealed that religious factors and financial constraints fear of disclosing their pregnancies to their parents influenced non-utilisation of antenatal care services by adolescents.

Although utilisation of institutional delivery services is still regarded as low in Zimbabwe, studies on factors influencing use of health facility for delivery are also scarce. Mugweni et al. (2008) investigated factors contributing to poor institutional delivery among women who attended ANC services in Marondera district in Zimbabwe and found out that women preferred home deliveries. The study revealed that women expected cleanliness and non-interference during labour and delivery and such expectations are met at home. According to these women, cultural expectations are met at home with abundant family support. Institutional deliveries and accessing institutions for delivery were said to be costly by women. Other factors contributing to low utilisation of institutional deliveries identified included lack of knowledge regarding the danger signs of pregnancy, negative perceptions of skilled health personnel working at the health institutions.

In another study on factors contributing to disparities between ANC bookings and institutional deliveries in Marondera district of Zimbabwe, Mugweni (2011) found that distance was a major deterrent to institutional deliveries. The author found that women were dissatisfied with maternity services provided in the health institutions and wanted to be treated with respect. The study revealed that there was an ineffective communication between women and the service providers at the health institutions in Marondera district.

Studies on PNC service use are almost non-existent in Zimbabwe. A population-based study that examined factors associated with non-utilisation of PNC services was conducted in a peri-urban area of Zimbabwe by Hove et al. (1999) and found that religion played a pivotal role in influencing women to utilise PNC services. The authors found out that women belonging to the apostolic religion were less likely to use PNC services. The study also showed that women who had non-medical birth attendance were more likely not to use the PNC services.

The reviewed studies on utilisation of reproductive health services in Zimbabwe ignore the importance of the influence of community-level effects on use of reproductive health services. Such studies are limited in their ability to draw inferences about community-

level barriers to utilisation of reproductive health services. Besides being limited in terms of scope, most of them focus on women in general and as such may not necessarily provide accurate information on reproductive health needs for adolescents as a special group.

This thesis will examine community-level effects of quality of health care, barriers to health care access and socio-economic development on adolescent women's reproductive health care utilisation in Zimbabwe. The reviewed literature globally and in SSA has shown the importance of the influence of quality of care (De Allegri et al., 2011; Sovd et al., 2006; Glei et al., 2003), access to health care (Sunil et al., 2006; Gage & Calixte, 2006; Glei et al., 2003; Stephenson & Tsui, 2003; 2002) and socio-economic development (Aremu et al., 2011; Gage, 2007; Kirby & Kaneda, 2005; Magadi et al., 2003; Stephenson & Tsui, 2002) on reproductive health care utilisation.

2.4. Deficiencies in Existing Literature

Although some of the individual-level studies reviewed use data that can be generalised, they were limited in focus. It is worth mentioning again that studies that ignore the impact of community-level influence are limited in their ability to draw deductions about community-level effects on the use of reproductive health services. Such studies provide information that can only be modelled around individuals or households. The significance of the effects of community variables is thus underestimated. Studies that examine the impact of community characteristics use random variables to model the variation between communities and thus provide a good estimation of the effect of variables at both the individual and community level. Most reproductive health programme decisions are made at community level hence the need to have more accurate measures of community-level parameters.

Most of the studies reviewed concentrated on women in general and failed to address the special needs of adolescents. Adolescent women are a key constituency in efforts towards reducing maternal mortality in developing countries. Most studies that investigated community-level influences did so in single country settings, but a few did so with several countries at a time. Such studies examined the effect of one aspect of the

community on reproductive health care utilisation, such as the influence of quality of health care (Sovd et al., 2006; Glei et al., 2003), access to health care (Sunil et al., 2006; Glei et al., 2003) and socio-economic development (Aremu et al., 2011; Gage, 2007). It is important to note that there is no singular community effect on the use of reproductive health services (Stephenson and Tsui, 2002).

Studies that investigated community-level influences on reproductive health utilisation did not examine the moderating effects of community-level variables on the association between individual-level variables and reproductive health utilisation. Both community and individual-level characteristics have been found to influence each other in dynamic ways that can modify how they influence health behaviour (Schreier & Chen, 2013). It is therefore critical to examine if community-level characteristics in this study do moderate the association between individual-level characteristics, and adolescent women's utilisation of reproductive health care in Zimbabwe. This study addresses this research gap allowing for more complete tests of theories on multilevel modelling. This approach provides evidence on which community-level aspect can be targeted for policy intervention. This is an effective method as most of the reproductive health policy interventions that influence reproductive health behaviour are implemented at community level.

This study would provide important information on the influence of quality of reproductive health care, barriers to health care access and socio-economic development on adolescent women's utilisation of reproductive health care in Zimbabwe. It will provide direction on where reproductive health interventions should focus to improve utilisation of reproductive health care services by adolescent women. Such information would provide a basis for informed programming intended to improve utilisation of reproductive health services by adolescent women. This study used a nationally representative 2010/11 ZDHS data to quantify both individual and community-level influences on adolescent utilisation of reproductive health services. The use of multilevel modelling techniques in this study provided a more rigorous analysis of the relationship between micro-level (or individual) and macro (or contextual) variables, and reproductive health care utilisation by adolescents in Zimbabwe.

CHAPTER 3: THEORIES AND CONCEPTUAL MODELS

3.1 Theoretical Framework

The use of different approaches and models to explain health seeking behaviour has been increasing in recent decades. Such models attempt to look into what causes individuals to behave the way they do when confronted with health related problems (MacKian, 2002). However, they have limited application in explaining the complex interactions between social, cultural and the environment in detail. This study used a modified Behavioural Model of Health Service Use (BMHSU) to explain the complex effects and interactions of individual and community-level variables on the use of reproductive health care services by adolescent women in Zimbabwe.

The BMHSU was originally developed by Andersen and Newman in 1973 to explore the use of biomedical health services by focusing on the individual as the unit of analysis and was later applied by Weller and others (1997) on utilisation of traditional and home treatment as a later version. The original Anderson model (1968) was developed to test hypothesis about inequalities of access to health services in the United States of America using family as a unit of analysis. According to the model, use of health services is a function of three chronological factors that influence health care service utilisation and these are predisposing factors, enabling or impeding factors and the need for care factors. The model assumes that factors sequentially determine utilisation of health services as follows: predisposition to use services, the ability to use services and the need to use services. The latest version of the BMHSU (Anderson, 1995) takes into account the need, population characteristics, health care systems and the external environment. It emphasises the dynamic and recursive nature of a health services' use model which includes health status outcomes. The model has a feedback loop which shows that the outcome does affect predisposing factors and perceived need for services as well as health behaviour. As a prediction model that provides information on what factors predict levels of utilisation, Anderson's framework has been criticized for overlooking the underlying causes of inequality and ill health (van Enk, 2002; Wild et al., 2010).

Lately, another version of the BMHSU model which is similar to that of Anderson (1995) was created to illustrate utilisation of maternal health services in Timor-Leste (Wild

et al., 2010). In this a multi-layered explanatory model, the authors proposed an empirically informed framework to illustrate the complex factors that influence women's birth choices. They suggest that decision making should be seen in the broader social context and that it should be recognised as a multifaceted process intimately tangled with local belief systems and social relationships. The framework depicts the many layers of influence on the use of maternal health services. The framework demonstrates the interrelationships between individual experience and aetiology; the underlying socio-cultural constructions of pregnancy, birth and appropriate treatment; the broader socio-political structures; as well as health system determinants affecting decision making and access to care.

The model proposed by Wild and others (2010) over-emphasises the level of effect of birth experience at individual level in influencing women to utilise maternal health care. This is a major limitation because it underplays the effect of individual level socio-demographic factors such as age, marital status, maternal education, and occupation and income levels. It, however, emphasises the importance of the contextual effects on decision-making and access to care. The importance of community-level factors in influencing women's decision to utilise health care services is also acknowledged.

A number of studies have used the BMHSU framework to investigate the determinants of health care utilisation (Kirby & Kaneda, 2005; Haas et al., 2004; Glei et al., 2003). For example, a study carried out to examine factors linked with use of biomedical care in Guatemala used the BMHSU model with minor adaptations to provide an organisational structure for the determinants of pregnancy care (Glei et al., 2003). In the United States of America (USA), a study that was carried out by Haas and others (2004) used the behavioural and expanded it to incorporate contextual indicators in addition to individual characteristics. The study provided a broader viewpoint on the probable causes of the tenacious racial/ethnic dissimilarities in access to health care in USA. A study by Kirby and Kaneda (2005) in the USA also uses the BMHSU model as a theoretical base to understand the determinants of health care utilisation. The authors modified the model to include the context of neighbourhood socio-economic disadvantage in addition to individual level characteristics.

3.2 Conceptual Framework

The models by Anderson (1995) and that by Wild and others (2010) were drawn with some modification to be compatible with adolescent reproductive health service utilisation situation in Zimbabwe. Figure 1 portrays the study's conceptual framework as adapted from Anderson (1995) and Wild and others (2010) models and modified to include community level influence on reproductive health utilisation. It shows conceptual pathways between adolescent women's background and context (community level) and utilisation of reproductive health services (contraceptive use, delivery at health facility with assistance from trained personnel, and PNC).

The main outcome is use of reproductive health care services which can be influenced by individual and household-level factors, as well as the community-level (context) factors. At individual and household levels, predisposing factors such as age, marital status, age difference between woman and spouse, level of education, parity, religion, autonomy, access to media and residence are expected to influence an adolescent decision to use reproductive health care services. Durable goods and household assets are enabling factors that influence use of reproductive health services by adolescents as well. The effect of community variables is expected to be mediated through individual variables. Community-level factors included the provincial quality of reproductive health care, provincial barriers to health care access, and provincial socio-economic development. The literature review has shown that the context in which women live can influence their decision to use or not to use reproductive health care services.

The study's conceptual framework illustrates that community-level variables may have a direct and an indirect contribution on women's decision to utilise services. Socio-economic development of the community in the framework has been recognised to directly impact use of services and some literature reviews also indicate that it does sometimes operate through individual level factors to influence use of services. Socio-economic development context is measured using the principal component analysis using proxies such as the mean number of children per women, the proportion of women with two or less children ever born, proportion of females with at least secondary education, proportion of women with partners approving of use of contraception, contraceptive prevalence rate (CPR), proportion of women accessing ANC at least once, proportion of women who

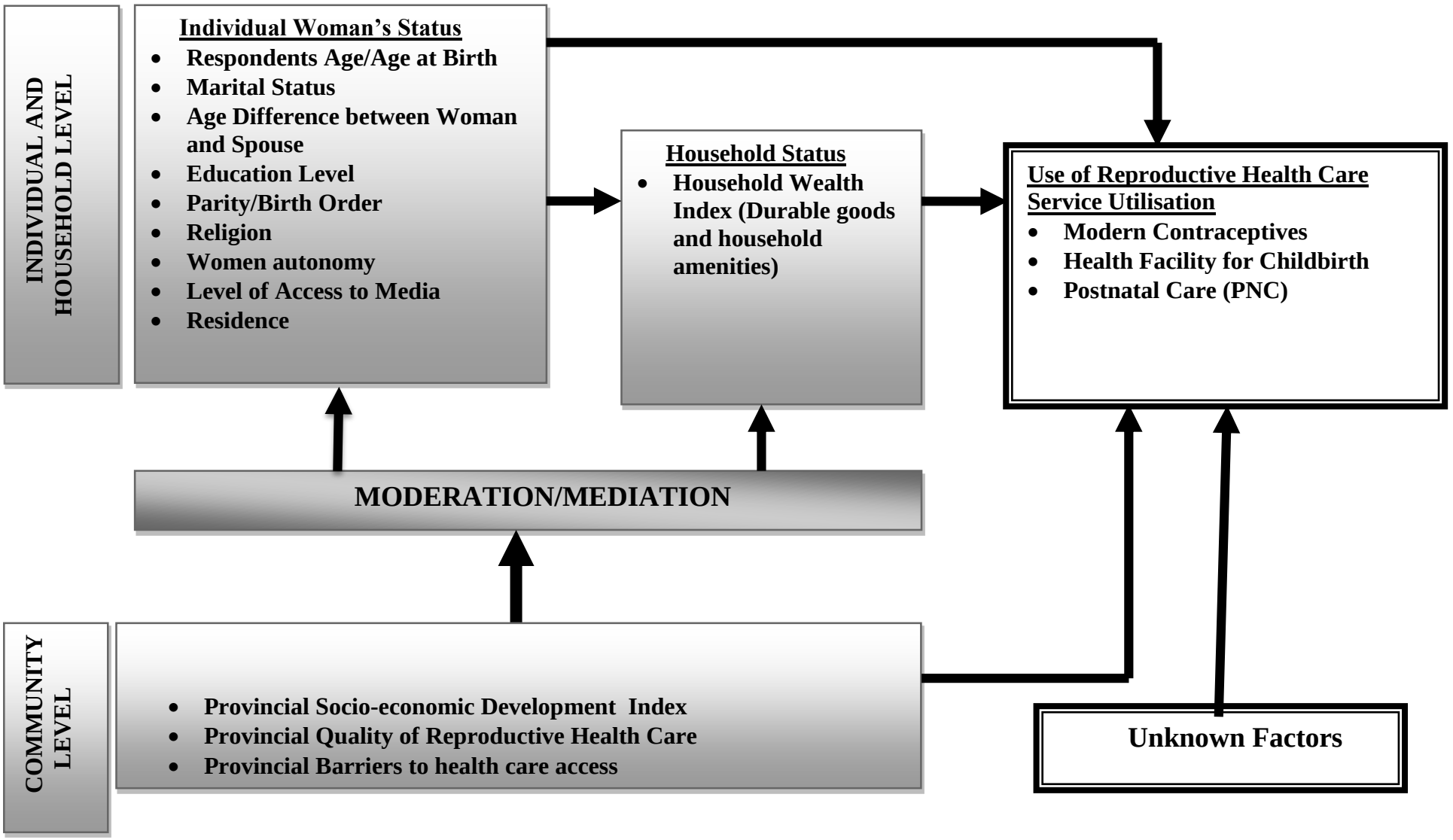
delivered their last child in a health facility, and proportion of women participating in labour force and proportion of women living above poverty level (20% or more household wealth quintile). Measures for these factors are at the provincial level to represent the level of impact at community level.

The other community-level variables that are expected to influence an adolescent woman's decision to use reproductive health services is the provincial quality of reproductive health care and provincial barriers to health care access. The quality of reproductive health care services involves activities carried out during ANC, delivery and PNC such as medical examination procedures, counselling activities and drugs and supplies offered for women at the provincial level. Provincial barriers to health care access includes the community perspective regarding barriers to seek medical care in case they fall sick or need medical assistance. It covers aspects such as getting permission, affordability, distance and transportation to the nearest health facility. To achieve this measurement, access to health services for this study was measured by using the women's perceived barriers in accessing health care in four major areas that included getting permission, affordability, distance and transportation.

There may be other unknown factors that are likely to influence adolescent women's use of reproductive health care services both at individual and community levels. For example, macro-level influence may emanate from the political influence and other socio-cultural factors such as traditional beliefs and norms. Literature has shown that issues such as traditional beliefs in aetiology of ill-health conditions, beliefs in use of traditional medicine, attitudes towards modern health facility and preference for traditional birthing practices have an impact on use of reproductive health services. Due to data limitations, such information was not captured and analysed. This framework emphasises that the association between individual and household-level variables with reproductive health utilisation is likely to be moderated by the effects of community-level variables. It is important to consider unknown factors that can affect utilisation of reproductive health services because use of such services has been found to be impacted by other factors that cannot be explained. Other studies also found out that although community-level contextual variables explain some variations between community clusters, it does not offer explanation for all of such variations.

In summary, it is hypothesised that the provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development has an effect on adolescent reproductive health care utilisation by creating a service, physical and social environment that influences reproductive behaviour. Additionally, it is argued that the control of the composition of individuals within provinces of Zimbabwe will not compromise the association between community-level variables and reproductive health care utilisation by adolescent women.

Figure 1: Conceptual Framework on the Relationship between Community-level Variables and Adolescent Women's Reproductive Health Care Utilisation, adapted and modified from Anderson (1995) and Wild et al. 2010



3.3 Hypotheses

The following hypotheses were stated:

- Hypothesis 1:
    - H_0: There is **no** relationship between micro-level (individual and household) variables (i.e. age, age at birth, parity/birth order, age difference with spouse, level of education, religious affiliation, level of media access, household wealth index, level of autonomy) and adolescent utilisation of reproductive health care services.
    - H_1: A significant relationship exists between micro-level (individual and household) variables (i.e. age, age at birth, parity/birth order, age difference with spouse, level of education, religious affiliation, level of media access, household wealth index, level of autonomy) and adolescent utilisation of reproductive health care services.
- Hypothesis 2:
    - H_0: There is **no** relationship between macro-level (contextual) variables (provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index) and adolescent utilisation of reproductive health care services in Zimbabwe.
    - H_1: A significant and positive relationship exists between macro-level (contextual) variables (provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index) and adolescent utilisation of reproductive health care services in Zimbabwe.

- Hypothesis 3:
    - H_0: The level of effects of micro-level (individual and household) variables on adolescent reproductive health care utilisation in Zimbabwe will **not** depend on the macro-level context in which the adolescent resides, such as provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index.

- H_1: The level of effects of micro-level (individual and household) variables on adolescent reproductive health care utilisation in Zimbabwe will depend on the macro-level context in which the adolescent resides such as provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index.

- Hypothesis 4:
  - H_0: The overall contribution of contextual effects of provincial quality of reproductive health care, provincial access of health care and provincial socio-economic development index to adolescent utilisation of reproductive health services in Zimbabwe **do not** outweigh that of micro-level (individual and household) variables.
  - H_1:The overall contribution of contextual effects of provincial quality of reproductive health care, provincial access of health care and provincial socio-economic development index to adolescent utilisation of reproductive health services in Zimbabwe outweigh that of micro-level (individual and household) variables.

CHAPTER 4: METHODOLOGY

4.1 Study Setting

Zimbabwe is the study area. It is one of the countries in the Sub-Saharan region located in Southern Africa. It is a landlocked country bordered by Botswana on the west, Zambia on the northwest and north, Mozambique on the east and South Africa on the south. Administratively, Zimbabwe is divided into eight provinces and two cities with provincial status. The two cities are Harare and Bulawayo, and other provinces include Matebeleland North, Matebeleland South, Manicaland, Mashonaland Central, Mashonaland East, Mashonaland West, Midlands and Masvingo (see figure 2). The study population includes all adolescent women aged 15 to 19 years old.

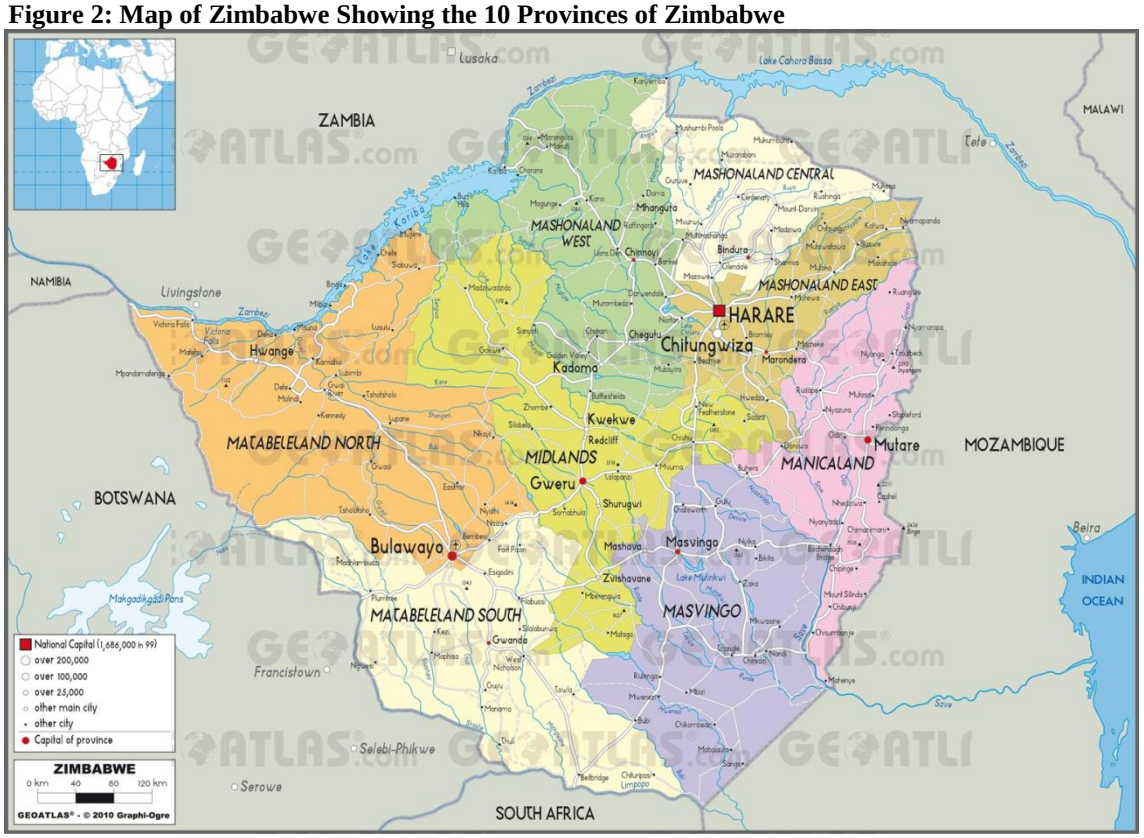
The 2012 census indicated that Zimbabwe had 13.1 million inhabitants by 2012 with 65% of the household headed by males. The annual growth rate was estimated at 1.1% whereas the sex ratio was 93 males per 100 females. Fourty one percent of the population was under 15 years whereas 4% was above 65 years. Marriage in Zimbabwe is an important social institution with which women have to demonstrate their muliebrity[1]. This social pressure results in early marriages and consequently early childbearing. About three fifths of women in Zimbabwe are reported to be married (59.4%) (ZIMSTAT & ICF International Inc., 2012). Child marriage is also prevalent with about a third (31%) of youth aged 20 to 24 years getting married before the age of 18 by 2015 (UNICEF, 2015). The total fertility rate was estimated at 3.8 with continuing high mortality (ZIMSTAT, 2012). Teenage fertility however rose from 21% in 2002/06 to 24% in 2010/11 (ZIMSTAT & ICF International Inc., 2012) with huge variations between rural and urban areas. Almost half of the young girls become pregnant before reaching 19. Other reproductive health concerns include the high maternal mortality being experienced in Zimbabwe which was estimated at 960 per 100 000 live births by 2010/11 (ZIMSTAT & ICF International Inc., 2012).

Zimbabwe faced severe economic challenges during the 2000 and 2008 period resulting in high unemployment levels and the loss of skilled labour due to out-migration. Currently, remittances from the Zimbabwe Diaspora remain an important source of income

[1] This is the state of being a woman.

for both the families and the economy of Zimbabwe. In 2010, the Gross Domestic Product grew by an estimated 8.1% (UNDP and Government of Zimbabwe, 2010).

Figure 2: Map of Zimbabwe Showing the 10 Provinces of Zimbabwe



4.2 Data Source and Sample

This study used secondary data sources which involved the use of an existing 2010/11 DHS survey in Zimbabwe (ZDHS). The 2010/11 Demographic Health Survey was designed to collect data on fertility, family planning and maternal and child health. It was designed such that data gathered is nationally and locally representative. This data is retrospective and the limitations of using retrospective data are discussed in chapter 10.3.2. Women aged 15 to 49 years who were found in selected households were individually interviewed on issues of fertility, family planning and maternal and child health. The study population for this thesis is women aged 15 to 19 years referred in this thesis as "adolescent women". A total of 9171 women were interviewed of which 23.2% (1945) were adolescents aged 15 to 19 years. Sample sizes for this study differ by reproductive health utilisation outcome and they are described in section 4.4 of this thesis which discusses measurement of the dependent variables.

The 2010/11 ZDHS provides micro-level (individual and household) and macro-level or contextual data. Micro-level data used for analysis includes socio-economic and demographic information about individual respondents. The survey provides household data on ownership of durable household assets and household amenities. Macro-level data provided by the survey consist of reproductive health care services given to women during ANC, delivery of child and during PNC. The survey also provides information on variables that are used to develop the socio-economic development index at community level is also provided.

4.3 Dependent and Explanatory Variables

4.3.1 Dependent (outcome) variables

Use of Contraceptives: The first dependent variable is whether adolescents are current users of modern contraceptives. All analysis on modern contraceptive use was based on the weighted sample of 457 non-pregnant adolescent women who had sex within 12 months prior to the 2010/11 ZDHS. The sample excluded adolescent women who reported being pregnant at the time of the survey, those that did not know the timing of their last sexual activity and those that had their last sex beyond the 12 months preceding the survey. From the 1945 adolescent women in the survey, 29.7% (578) reported to have had their last sex during the 12 months preceding the survey. Out of the 578 adolescent women, 20.9% reported being pregnant at the time of the survey and were excluded during analysis of this reproductive health care utilisation outcome.

During the survey, adolescent women were asked if they were currently doing something or using any method to delay or avoid getting pregnant. Those that reported doing something or using any method to delay or avoid getting pregnant were further asked to indicate what they are doing or the method they are using. Adolescent women were then categorised as those using modern contraceptive method (using pill, IUD, Injection, Implants, Male/Female Condom, Diaphragm or Lactational Amenorrhea Method) and those that do not use modern contraceptive method (either using withdrawal, periodic abstinence, folklore method or nothing at all). Those using modern contraceptive were coded as 1, otherwise they were coded as 0.

Use of health facility for delivery care by adolescents: The second main outcome measuring sexual and reproductive health care utilisation by adolescents in Zimbabwe is use of health facility for delivery of last birth. A dichotomous variable to indicate whether a woman delivered their last child as an adolescent in a health facility five years preceding the survey was created. A total sample of 660 women reported to have delivered a child as an adolescent during the five years preceding the survey. Any woman who reported having delivered their last child as an adolescent elsewhere besides the health facility during the five years preceding the survey was considered not to have utilised reproductive health care services for this outcome. A health facility in this study is any health institution recognised by the country health authorities such as a government or private hospital, a government or private health centre or clinic, a government or private health post or any other private medical facility. Use of health facility for delivery has been associated with assistance with skilled delivery attendant in Zimbabwe. A health facility with a skilled attendant is linked with emergency obstetric care, an enabling environment that includes adequate supplies, equipment, systems of communication and referral services.

Use of PNC services by adolescent women: A third dependent variable was whether a woman who delivered a child as an adolescent in the five years preceding the survey received PNC services within the first 48 hours after delivery of their children. PNC services included being examined by a skilled health worker immediately after delivery. There is sufficient evidence that point towards the need for a woman to receive PNC services immediately after birth (Howlader et al., 1999). Several studies have documented the relationship between adverse birth outcomes and adolescent pregnancies such as increased neonatal mortality among infants born to adolescent women (Chen et al., 2007; Zabin & Kiragu, 1998; Otterblad Olausson et al., 1999). A large proportion of these negative outcomes occur within 48 hours after delivery. To treat complications occurring from delivery, it is essential that mothers receive PNC within 48 hours after delivery. It is during the PNC check that mothers receive crucial information on self and child care. Analysis for these outcomes involved use of a weighted sample of 660 women who delivered their last child as adolescents during the five years preceding the survey.

4.3.2 Independent variables

Community-level (contextual) variables

Provincial quality of reproductive health care index: To measure the quality of reproductive health care, a composite variable depicting quality to Reproductive Health Care services at primary sampling unit (PSU) (Provincial) level was created to come up with an average number of reproductive health care services given to women. Reproductive health care service questions used include examinations done during ANC, the counselling or health education given to females, treatment and supplies given, and type of assistance during delivery and PNC.

During the survey, respondents were asked whether the following had been done at least once on them; blood pressure measured, urine sample taken and blood sample taken as part of the examination during the ANC. The three variables were coded "Yes" versus "No". On counselling or health education, respondents were also asked whether they were told about the signs of pregnancy complications. The variable was coded "Yes" against "No/Don't know". With regard to treatment and supplies, respondents were asked if they were given any injection in the arm to prevent the baby from getting tetanus, which is convulsions after birth, whether they were given or bought any iron tablets during the pregnancy, and whether they were given or bought intestinal parasite drugs during pregnancy. Coding for the two variables were "Yes" versus "No/Don't know". These activities are in line with the WHO recommendations (Banta, 2003) to improve maternal health care among women.

The last two variables involved in measuring quality to health care entailed assistance from qualified or skilled health personnel during delivery of last child five years preceding the survey, and a health check by skilled health care personnel before discharge after delivery of last child. Coding for this variable was "Skilled Health Personnel (doctor, nurse/midwife) versus other unskilled personnel (traditional birth attendant, relative friend, no assistance or any other person who is not health personnel). The variable was coded "Yes" and "No".

For each of the nine services provided, a score of 1 was awarded otherwise a score of 0 was given. A score depicting the number of reproductive health services provided for each woman was derived by summing up the scores awarded for each service provided and this ranged from 0 to 9. The provincial quality of reproductive health care index was created by averaging the number of reproductive health care services provided for women in each PSU (Province). The closer the index is to the value 9, the higher the quality of

reproductive health services in the Province. The index was further divided into two using the grand mean as a cut-off point and then categorised as low quality and high quality.

Provincial barriers to health care access: This macro-level variable was measured by using women's experience in four areas that included getting permission to go for treatment, getting money for treatment, distance to a health facility, and having to take transportation. These questions ensure that barriers to access cover a wide range of areas such as ability to go for treatment, affordability, distance to health facility and mobility (transportation). Women were asked whether the following is a big problem or not when they are sick and want to get medical advice or treatment; (1) getting permission to go to the doctor, (2) getting money needed for advice or treatment (3) the distance to the health facility and (4) transportation.

From these questions, the proportion of women experiencing at least one of the problems accessing health care was derived. This was done for each province in Zimbabwe. The higher the proportion of women experiencing at least one problem accessing health care, the lower the level of barriers to health care access for women in the province. The provincial barriers to health care access was further divided into two using the grand mean proportion as the cut-off point and categorised as high proportion and low proportion. This was done after the proportions were grand mean centred. Province with a high proportion represent low barriers to health care access by women and province with low proportion representing higher barriers to health care access by women.

Provincial socio-economic development Index: The following variables were assessed for reliability in measuring socio-economic development at provincial level using the principal component analysis (PCA).

- The proportion of women with two or less children ever born:
- Proportion of females with at least secondary education:
- Proportion of women with partners approving of use of contraception:
- Contraceptive prevalence rate (CPR),
- Proportion of women accessing ANC at least once,
- Proportion of women who delivered their last child in a health facility and
- Proportion of women participating in labour force.

- Proportion of women living above poverty level (20% or more household wealth quintile).

The PCA requires that there be some correlations greater than 0.30 between the variables included in the analysis. For this set of variables, there are eight out of ten correlations in the matrix that were greater than 0.30 (see Correlation Matrix for the PCA in Appendix 1). By using a factor solution, the proportion of variance in the original variables that is accounted for (also termed the communality value) is derived. The factor solution should explain at least half of each of the original variables variance, that is, the communality value for each variable should be 0.50 or higher. Any variable with a communality value less than 0.50 were removed one at a time and the principal component analysis computed again.

A total of three (3) variables were removed because their communality values were less than 0.50 and the following variables were used to obtain a socio-economic development index for each province:

- The proportion of women with two or less children ever born:
- Proportion of females with at least secondary education:
- Proportion of women who delivered their last child in a health facility and
- Proportion of women participating in labour force.
- Proportion of women living above poverty level (20% or more household wealth quintile).

Another requirement is that the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy be greater than 0.50 for each individual variable as well as for the set of variables (Kaiser, 1974). All the individual variables had a KMO measure of more than 0.50 and the probability associated with the Bartletts test of Sphericity was less than 0.001 which satisfies the requirement (see appendix 1).

There were two Eigen values greater than 1.0 which indicates that there were two components that were extracted for these variables. The table showing the total variance explained and the scree plot in the PCA results as shown in appendix 1 indicate that the two components explained 93.9% of the variance. A Cronbach's Alpha was computed to verify that the variables for a component measure with similar entities that are legitimate

to add together. If the Cronbach's Alpha is 0.70 or greater, then we have sufficient justification to support creation of a summated scale using existing items (Cronbach, 1951; Kline, 1999).

The Cronbach's Alpha was 0.902 which implies that about 90% of the variability in a composite factor score by combining the 5 variables used to measure socio-economic development index was considered a reliable score variance. Factor scores were derived for each province. From the factor scores with a mean value of 0 and a standard deviation of 1, socio-economic development index was then categorised into 2 categories: Lower and Higher. All provinces with a factor score of less than zero (0) were categorised under lower socio-economic development index and those with a factor score of more than zero (0) were categorised under higher socio-economic development index. Thus, lower socio-economic development index refers to provinces that are considered to have a lower socio-economic development and higher socio-economic development index referred to provinces with a higher socio-economic development. Table 1 shows that community-level variables that were used in modelling reproductive health care service utilisation outcomes.

Micro-level (individual and household) control variables

Individual-level variables include age, maternal age at birth, marital status, age difference with partner/spouse, parity, birth order, education, religion, access to media, residence, household wealth index and level of autonomy. Studies have shown that these variables have an influence in reproductive health care service utilisation (Gotsens & Rodriguez-Sanz, 2012; Gilliam et al., 2011; Sonneveldt et al., 2013; Spangler & Bloom, 2010; Babalola & Fatusi, 2009; Audu et al., 2008; Stephenson et al., 2006; Oye-Adeniran et al., 2006; Saleem & Bobak, 2005; Nagase et al., 2003). Table 2 shows a list of individual level variables by their brief definitions and coding.

Age: This is the self-reported age of the respondent at the time of the survey (range is 15 to 19 years). The ages of the adolescent women were categorised into two groups, which is adolescent women aged 15 to 17 years and those aged 18 to 19 years.

Maternal age at birth: This is the maternal age at childbirth of the woman. This is derived by subtracting the century month code (CMC) of the date of birth for the last child

in the five years preceding the survey from the century month code of the date of birth of the woman. The age at birth was categorised into 15 to 17 years and 18 to 19 years.

Marital status: Self-reported marital status of women was categorised into the never married and the ever married. The ever married combined the married, divorced, separated and the widowed.

Age difference with partner/spouse: This is the difference between the age of the husband or partner at the time of the survey and the age of the respondent at the time of the survey. Age difference between woman and spouse is categorised into large difference and small or no difference. Large difference refers to the age difference which is five years and above and small or no difference refers to the age difference which is at least less than four years.

Parity: This is the number of previous pregnancies for the woman and is an important component of the woman's reproductive history and may influence health seeking behaviour for the adolescent. This control variable was used for analysing the influence of micro and macro level variables on utilisation of modern contraceptive methods. The variable was treated as discrete.

Table 1: Community Variables used in Modelling Use of Modern Contraceptives, Health Facility for Childbirth, and PNC Services in Zimbabwe.

Community Level Variables	Operational Definition
Provincial Quality of Reproductive Health Care Index	• A composite index of the mean number of selected reproductive health services in the Province provided to women (Low Quality, High Quality)
Provincial Barriers to health care access	• Proportion of Women in the Province experiencing at least one problem accessing health care (High Proportion, Low Proportion)
Provincial Socio-economic Development Index	• An index developed using principal component analysis from the following variables: (1) The proportion of women with 2 or less children ever born in each province; (2) Proportion of females with at least secondary education per province; (3) Proportion of women who delivered their last child in a health facility per province; (4) Proportion of women participating in labour force and (5) Proportion of women living above poverty level (20% or more household wealth quintile) • The Provincial Socio-economic Development Index had a mean of 0 (zero) and a standard deviation of 1 and was categorised as high socio-economic development and low socio-economic development using the mean as a cut-off point

Table 2: Individual, Household and Community Variables used in Modelling Utilisation of Reproductive Health Care by Adolescent Women in Zimbabwe.

	Operational Definition and Coding	Dependent/Outcome Variable
Individual and Household Variables		
• Age	• Self-reported age of respondent at the time of the survey [15 to 17 years; 18 to 19 years]	• A
• Maternal Age at Birth	• Age of mother at birth of the last child [15 to 17; 18 to 19 years]	• B, C
• Marital Status	• Marital Status of the Respondent [Never Married; Ever Married (Married/Separated/Divorced/Widowed)]	• A, B, C
• Age Difference with Partner/Spouse	• The is the age difference between the self-reported age of respondent and the given age of the husband/spouse/partner [Large (5 or more years); Small or None (Less than 5 years)]	• A, B, C
• Parity	• Number of Children ever given birth [None, One or More]	• A
• Birth Order	• The chronological order of the last child born to a woman in the five years preceding the survey (First birth; Second or more births]	• B, C

Individual and Household Variables	Operational Definition and Coding	Dependent/Outcome Variable
• Education	• Highest Level of Education attained [None/Primary; Secondary or Higher]	• A, B, C
• Religious Affiliation	• Self-Reported Religious Group [Protestant/Pentecostal, Traditional/Apostolic Sect; Catholics/Muslim/Other†/None]	• A, B, C
• Residence	• Current Place of Residence [Urban; Rural]	• A, B, C
• Level of Media Access	• A composite variable derived from the frequency of access to newspaper/magazine, radio and television [No Access; Medium Access; High Access]	• A, B, C
• Household Wealth Index	• A composite index of household possessions, assets and amenities [Low; Medium; High].	• A, B, C
• Level of Autonomy	• A composite variable showing woman's participation in household decision making on health care, large household purchases, daily household purchases and mobility (visiting families and relatives) [Low Autonomy; High Autonomy]	• A, B, C

Key: A = Use of Modern Contraceptives; B= Use of health facility for Delivery of last child, C= Use of Postnatal Care services, † = Other Religions

Birth order: This variable is the chronological order of the last child born to a woman in the five years preceding the survey. The birth order was used to analyse utilisation of health facility for childbirth and PNC services. The variable was categorised into first birth order and second or more birth order. The variable provides a good representation of the maternal experience of the adolescent woman at the time of giving birth as well as immediately after giving birth of the last child. This explanation is also provided in Table 2.

Education: This variable denotes the highest level of education attained by the adolescent women at the time of the survey. Due to the small number of adolescent women who have never been to formal education, the education level of women has been categorised into two. Those with no formal education were put together with those with primary school as their highest level of education. The other category represented all women with secondary and tertiary level as their highest level of education.

Religion: This is a self-reported religious group at the time of the survey. This has been categorised into the following 3 groups: Those affiliated to the Protestant and Pentecostal denominations were categorised together and coded as 0, those belonging to the Traditional and Apostolic Sect put together and coded 1 and the last group is Other Religions and was coded 2. Other groups include the Catholics, Muslim, Other Christians and those not affiliated to any religion.

Level of access to media: The indicator for level of access to media is a composite variable derived from the following 3 questions asked to the respondents; 1) Do you read a newspaper or magazine almost every day, at least once a week, less than once a week or not at all?, 2) Do you listen to the radio almost every day, at least once a week, less than once a week or not at all?, 3) Do you watch television almost every day, at least once a week, less than once a week or not at all?. Responses to all the three questions were coded as follows: 0) Not at all, 1) Less than once a week, 2) At least once a week, 3) Almost every day. To develop the composite variable, a Cronbach's Alpha was estimated since it is a good measure of internal consistency. The Cronbach's Alpha was 0.749 which implies that about 75% of the variability in a composite score by combining the 3 variables used to measure access to media, is considered a reliable score variance. Any Cronbach's Alpha estimate of 0.7 and above is considered a reliable measure of internal

consistency (Cronbach, 1951; Kline, 1999). The codes for each of the three questions were used as scores and all the scores from the three questions were summed up for each respondent to create a level of access to media score. The score ranged from 0 to 9 and was then collapsed into three categories indicating the level of access to media. Respondents with scores ranging from 4 to 9 were regarded as having high access to media; those with scores ranging from 1 to 3 were regarded as having medium access to media. Those who scored 0 were regarded as having no access to media.

Residence: The operational definition of this variable is whether the respondent resides in a rural or an urban area.

Household wealth index: A variable involved enabling factors that include durable goods and household assets/amenities. The household wealth index was derived through PCA from 10 household possessions (radio, television, mobile telephone, non-mobile telephone, refrigerator, bicycle, motorcycle/motor scooter, animal drawn cart, a car/truck and a boat with a motor) and household assets/amenities (drinking water, toilet facility, availability of electricity, floor material, fuel for cooking and ownership of land). To determine the index, each of the items was assigned a factor score and then individuals were ranked according to the total factor score of the household they live in. This information is then used to come up with a household asset index using the PCA (ZIMSTAT & ICF International Inc., 2012). The household wealth index is in quintiles and is used to estimate a household's economic wellbeing. These were further categorised into low wealth (Poor and Poorest quintiles), medium wealth (Medium quintile) and high wealth (Rich and Richest quintiles). The household wealth index is used to estimate a household's economic wellbeing.

Level of autonomy: The 2010/11 ZDHS data provides several questions that were used to measure the women's autonomy and decision-making. To measure women's autonomy, a composite variable depicting the level of women's autonomy and decision making was derived from a selected four dimensions of women's autonomy. Their participation in household decision making on health care of self, large household purchases, daily household purchases, and visiting families or relatives. Responses to these questions are coded 1) Respondent, 2) Respondent and Husband/Partner Jointly, 3) Respondent and Someone else, 4) Husband/Partner and 5) Someone Else. A dummy variable was created such that any respondent who indicated being involved in the decision-making is coded as

1 otherwise its coded 0 (whether the decision is jointly or by the husband/partner alone). This was done by collapsing the first three categories (response 1, 2 and 3) and given score 1 since the respondent was involved in the decision making process, otherwise 0 score was awarded to the other categories. Summing up all the scores for each dimension of women's autonomy provided the level scales of women's autonomy ranging from 0 to 4. Women with scale 4 were considered to have high autonomy and those with 3 or less were considered to have low autonomy as they reported not participating in at least one aspect of household decision making. This is a good measure of the women's autonomy since health care utilisation can be hampered one way or the other by the lack of independence a woman has in any of the aspects considered.

4.4 Statistical Analysis

4.4.1 Univariate and Bivariate Analysis

Description of the main characteristics of the study population from the 2010 ZDHS was done using both univariate and bivariate analysis. There were two different study samples used for the analysis of study population depending on the dependent variable being analysed as indicated in section 4.3 and 4.4 of this thesis. For use of modern contraceptives, the percentage distributions for micro-level variables were displayed for non-pregnant adolescent women who had their last sex during the 12 months preceding the survey. The percentage distributions for use of health facility for delivery and use of postnatal care services was also done for women who delivered their child as adolescents in the five years preceding the survey.

4.4.2 Multilevel Modelling

The data from the 2010/11 ZDHS have information at different levels, namely individual and household level data, and provincial data. The data, therefore, is hierarchical in nature. The established relationships between variables for data that is hierarchical in nature should consider that observations from data sets are not necessarily independent. The application of most statistical methods in most studies usually assumes that such

observations are independent from each other. For this study, the study population within provinces (Level 2) had common features. Since adolescent women are nested within provinces, it is said to be hierarchical in nature. The data for this study, therefore, required techniques that offer a rigorous method for measuring the influence of macro-level variables and unobserved contextual effects on utilisation of reproductive health services by adolescent women while providing a robust method for analysing multilevel data - hence multilevel modelling (Diez-Roux, 1998; Diez-Roux, 2001; Raudenbush and Bryk, 2002).

The multilevel modelling technique facilitated the estimation of macro-level effects on adolescent reproductive health care utilisation by removing the effect of clustering in order to obtain valid point estimates for parameters. It also corrects the estimated standard errors for the point estimates to allow for clustering of observations within units (Goldstein, 1995) than the traditional regression method. This technique reduces chances of misestimating the significance of variables that act at different levels of the hierarchy when compared to use of the traditional method. Also corrected is how the variance is distributed across levels of the hierarchy. One other limitation of the traditional regression method is its inability to disentangle the contextual effects from compositional effects when estimating parameters for hierarchical data.

The three main outcome (dependent) variables of interest in this study (use of modern contraceptives, use of health facility for delivery of child, and receipt of PNC services) are all dichotomous. The appropriate model to be used for dichotomous health outcome is the hierarchical generalized linear model. Identification of the random effect is allowed by the multilevel models. It represents the extent to which the outcome of interest varies between each level. Since adolescent women are nested within provinces, it required the following two level combined multilevel regression equations for this study:

- ***Level 1 regression equation:***

$$\mathbf{Y_{ij} = \beta_{0j} + \beta_{1j}(X_{ij}) + e_{ij}} \qquad \mathbf{(1)}$$

Where:

- $\mathbf{Y_{ij}}$ refers to the score on the reproductive health care utilisation outcome for the i^{th} woman in the j^{th} province

- $\mathbf{X_{ij}}$ refers to the Level 1 predictor.
- $\boldsymbol{\beta_{0j}}$ refers to the intercept of the reproductive health care utilisation outcome in the j^{th} province (Level 2).
- $\boldsymbol{\beta_{1j}}$ refers to the slope for the relationship in the jth province (Level 2) between the Level 1 predictor and the utilisation outcome.
- $\mathbf{e_{ij}}$ refers to the random errors of prediction for the Level 1 regression equation.

- ***Level 2 Regression Equation***

Within the groups of Level 2, the coefficients at level 1, β_{0j} and β_{1j} become the dependent variables of the Level 2 regression equation. Thus;

$$\boldsymbol{\beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j}}$$

$$\boldsymbol{\beta_{1j} = \gamma_{10} + u_{1j}} \qquad \textbf{(2)}$$

Where:

- $\boldsymbol{\gamma_{00}}$ refers to the overall intercept. This is the grand mean of the scores on the dependent variable across all the provinces when all the predictors are equal to 0.
- $\mathbf{W_j}$ refers to the Level 2 predictor.
- $\boldsymbol{\gamma_{01}}$ refers to the overall regression coefficient, or the slope, between the outcome variable and the Level 2 predictor.
- $\mathbf{u_{0j}}$ refers to the random error component for the deviation of the intercept of a province from the overall intercept.
- $\boldsymbol{\gamma_{10}}$ refers to the overall regression coefficient, or the slope, between the dependent variable and the Level 1 predictor.
- $\mathbf{u_{1j}}$ refers to the error component for the slope (meaning the deviation of the province slopes from the overall slope)

Because the outcome is dichotomous, the model uses a binomial sampling model and a logit link (Raudenbush & Bryk, 2002). So the outcome $\boldsymbol{Y_{ij}}$ for the ith individual living in the jth province is thus written as follows:

Probability ($Y_{ij}=1|B$) = Φ_{ij}

Level 1 variance = [Φ_{ij} (1- Φ_{ij})]

Predicted log odds η_{ij}= log[Φ_{ij} /(1- Φ_{ij})]

$$\eta_{ij} = \beta_{0j} + \sum_{q=1} \beta_{qj} X_{qij} \quad (3)$$

Where:

Φ_{ij} refers to the probability that the i^{th} adolescent woman in the j^{th} province take the value 1, that is, the probability that an adolescent woman would utilise the reproductive health care services

β_{0j} is the level 1 intercept

β_{qj} is the level 1 coefficients and

X_{qij} refers to the level 1 predictor q for the i^{th} adolescent woman within the j^{th} province

The measure of association for the fixed effects included the odds ratios which were derived by computing the exponential of the predicted log odds. The predicted probability of an adolescent woman utilising a reproductive health care service was computed by converting the predicted log odds using the following formula:

$$\Phi_{ij} = 1/[1+\exp(-\eta_{ij})]$$

In the study, predicted probability formula has been simplified as the antilog function of Xβ: $p=[1+\exp(-X\beta)]^{-1}$.

For the Level 2 model, β_{qj} being the level 1 coefficients become the following outcome:

$$\beta qj = \gamma_{q0} + \gamma_{q1}W_{1j} + \gamma_{q2}W_{2j} + \ldots\ldots\ldots + \gamma_{qSq}W_{Sqj} + u_{qj}$$

$$= \gamma_{q0} + \sum_{S=1}^{Sq} \gamma_{qS}W_{sj} + u_{qj} \quad (4)$$

Where:

$\boldsymbol{\gamma qs}$ (where q=0, 1,……..Sq) are level-2 coefficients and $\mathbf{W_{sj}}$ are level-2 predictors and $\mathbf{u_{qj}}$ is level 2 random effect.

Just like other general linear regression models, the multilevel models have the same assumptions and that the error terms at every level of the model are normally distributed. Adolescent women are at level 1 and they are nested within provinces which is level 2. Since this is a simple additive model of level 2 macro-level variables, both levels (level 1 and level 2) were expected to have an equal intercept. The other assumption is that there is homogeneity of variance or rather equality of population variances (homoscedasticity) and that the cases are random samples from the population and that the scores of cases for each of the outcome variables are independent from each other (Salkind & Green, 2004). Province level errors were thus included in the model and there was no random effect at the individual level.

4.4.3 Estimation of parameters

Regression was applied for all the outcome (dependent) variables (use of modern contraceptives, use of health facility for delivery, and PNC service use) using separate models. Main control explanatory variables were included in each of the models. Model 1 was an empty model and Model 2 included all micro-level variables and model 3 introduced household variables only to determine the level of variance explained by the models. Model 4 included the macro-level variables and in Model 5, micro-level variables were put together with macro-level variables. To get to the final model (Model 6), control variables that were significant in at least 1 of the models were first included to test for the fit of the final model. To improve the goodness of fit for the model, some of the control variables that were not significant but were considered biologically important in influencing utilisation of the reproductive health care were also included in stages until a good fit was established. Random coefficients were tested to determine the coefficient model. For each successive model, the intra-class correlation coefficient (ICC) was derived. It measured the degree of resemblance within provinces and a reduction in the ICC parameter for a model indicates more heterogeneity across clusters. A lower ICC parameter in the successive model reveals a better fit and that clustering of reproductive

health care utilization was related to variables in the model and this was computed using the following formula:

- $ICC = \sigma^2_u / (\sigma^2_u + (\pi^2/3))$

In this hierarchical generalised linear model, it is also possible to derive "R^2 between" from variance components of each successive model. The "R^2 between" indicates the percent between the variance that has been explained by the addition of variables in the model, as compared to the null (empty) model. The formula is:

- R^2 between = (Variance of null model – variance of model)/Variance of null model.

The "R^2 between" is sometimes referred to as the proportional change in variance (PCV). There is no official goodness of fit test available for non-linear outcomes except using the PCV for alternative models. However, a high percentage reduction in the variance with reference to the random intercept variance of the empty model indicates a better fit (Yang, 2001). Alkaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) were used to test the goodness of fit but the parameters have been found to be inconsistently reliable tests for non-linear outcomes (Yang, 2001). However, the AIC and BIC tests were used sparingly and frugally for each of the three reproductive health care utilisation outcomes and where necessary, the PCV has been used to demonstrate the goodness of fit.

Data was manipulated to come with univariate and bivariate analysis for the dependent variables. Multilevel modelling was fitted using the Generalised Linear Mixed Models (Hierarchical Generalized Linear Model) using the IBM SPSS software package version 20 as it provides both the fixed effect intercept and the random effect variance for the models.

4.5 Meeting the Study Objectives

Generally, the study objectives were addressed as follows:

Objective 1: Quantitative data from the 2010/11 ZDHS survey was used to determine the levels of adolescent women's use of reproductive health care services in Zimbabwe. Percentage distributions of use of contraceptives, health facility for delivery and for PNC, and that of determinants considered in this study inferred are presented. Bi-variate analysis was conducted to assess any evidence of association of use of reproductive health services by various individual/household and community-level (contextual) factors. The chi-square statistics was used to test for evidence of association between the dependent variables and explanatory variables. Graphical and tabular techniques were used to display some of the characteristics of this study.

Objective 2: Since outcome variables are dichotomous, use of logistic regression is appropriate to determine the association between individual and household variables and use of modern contraceptives, utilisation of health facility for delivery, as well as use of PNC services by adolescents.

Objective 3: Multivariate analysis using multilevel logistic regression technique was used to examine the effects of macro-level variables on adolescent use of contraceptives, use of health facility for delivery, and PNC services. Five separate models were applied for all the outcomes (use of modern contraceptives, use of health facility for delivery and PNC services). The first model is an empty model; the second model includes only individual and household-level variables, the third model include only the macro-level variables. The fourth model involved putting all the micro and macro-level variables to determine the level of variance explained by the model and independent effects of macro-level variables were determined. The final model is used to answer objective 4 and 5 of the study. The importance of the effect of provinces in influencing utilisation of reproductive health services by adolescent women in Zimbabwe was summarised using the ICC, which also corresponds to the Variance Partition Coefficient (VPC). The ICC gives the proportion of the total variance accounted for in each model. In other words, it provided the degree of resemblance within the provinces and is computed using the following formula:

- $ICC = \sigma^2_u /(\sigma^2_u + (\pi^2/3))$

Objective 4: The final model of the multilevel logistic regression technique includes micro-level variables and macro-level variables that were associated with adolescent reproductive health care utilisation on the fourth model. Cross level interaction terms were

introduced on the final model to determine the moderating effects of macro level variables on the association between micro level individual variables and reproductive health utilisation.

Objective 5: From the final model, the contribution of macro-level variables to the probability of utilising reproductive health care was evaluated. The predicted probability of reproductive health care utilisation was calculated by working out the antilog function of **$X\beta$: $p=[1+\exp(-X\beta)]^{-1}$.** Substituting different values for each variable into the model equations both and observing the predicted probability of utilising reproductive health services by adolescent women would produce the contribution for each variable. This contribution refers to a change in the predicted probability of the variable being considered. A change in the predicted probability of a variable being computed is estimated by holding other variables constant at their mean. This is meant to ensure that the estimated change in the predicted probability would be due to that variable alone.

4.6 Ethical Issues

This thesis is based on analysis of secondary data from the 2010/11 Zimbabwe Demographic and Health Survey (ZDHS). The data ensures absolute anonymity through removal of identifiers for all individual and household cases. The 2010/11 ZDHS survey was reviewed and approved by the Institutional Review Board of the ICF Macro based at Calverton, USA and the Ethics Committee for the Zimbabwe National Statistics Agency (ZIMSTAT). Before the interviews, informed consent was sought from all participants during the survey and all the participants were assured of the anonymity and confidentiality of all information provided.

4.7 Quality Issues in Data

During the 2010/11 ZDHS survey, eligibility of women and men to be interviewed included all women aged 15 to 49 years and all men aged 15 to 54 years who were either permanent residents of the selected household or visitors who dwelled in the household

the night before the survey. This study involved women aged 15 to 19 years and hence the quality of information on age of women in the household during the study is critical since it is the one used for eligibility for the individual questionnaire interviews. This sub-chapter provides a general assessment of the quality of 2010/11 ZDHS data because it provides an overview of the potential bias results from the ZDHS data could provide.

4.7.1 Reporting on household age

It is critical that information on age is as accurate as possible as selection of adolescent women for this study is solely dependent on the accurate reporting of age at household-level. Rustein and Bicego (1990) have reported an intentional exclusion of eligible women in the assessment of DHS data quality for developing countries. This has been attributed to mischief during fieldwork to push eligible women out of range to reduce the number of women to be interviewed.

To identify whether there has been a systematic exclusion of eligible women or inclusion of ineligible women, age ratios (for women) and sex ratios for age groups immediately above and below the age eligibility boundaries are examined. The lower limit of the age eligibility for the 2010/11 ZDHS was 15 years and the upper limit was 49 years. Age ratio is defined as the ratio of the population in the given age group to one half of the population in the two adjacent age groups. The formula for the age ratio is given as:

$$\text{Age ratio} = \{{}_5P_x / [0.5*({}_5P_{x-5} + {}_5P_{x+5})]\}*100$$

Where ${}_5P_x$ is the age group from age x to age x+5, ${}_5P_{x-5}$ and ${}_5P_{x+5}$ are the preceding and the following age groups respectively. The expected value for the age ratio is 100.0. A deviation from 100.0 is a measure of net age misreporting. Table 3 shows age ratios for females and males as well as age specific sex ratios. The table also displays female and male age ratio deviations as well as sex ratio first differences. Figure 2 shows the graphical illustration of the magnitude of age misreporting during the 2010/11 ZHDS.

The highest net age misreporting is noted among the 50 to 54 year olds with age ratio deviation of 26.75 indicating a possible systematic inclusion of women in the 50 to 54 year age bracket from other lower age groups. Net age misreporting is also apparent among the 40 to 44 year olds and 45 to 49 year olds with negative age ratio deviations.

This indicates a systematic transference of women eligible for the individual interviews from these respective age groups into other age groups over 50 years. The age ratio deviation for the age group outside the lower eligibility boundary (10 to 14 years) is 15.55 which is above 100 whereas the age ratio deviation of the lower boundary (15 to 19 years) is -13.39 which is lower than 100. The age ratio deviation for the lower eligibility boundary shows a systematic exclusion of adolescent women in the 15 to 19 year old age bracket. Such age ratio deviations may have a bearing on the estimates for this study as potential adolescent women eligible for interview may have been selectively excluded to participate in the individual interviews. The sex ratio first differences also provide further evidence that the systematic exclusion of eligible or inclusion of ineligible women has occurred in the 2010/11 ZDHS.

The household population data was further examined for any evidence of age heaping. Age heaping occurs when there is preference (or dislikes) for certain digits. There are two methods used to detect if there are problems of age heaping. The first method is called the Whipple's Index and the second method is the Myers' Index. The Whipple's Index method is applicable where age is reported in single years and it can only measure the extent of age heaping at the digits 5 and 0. The index uses the following formula:

Whipple's Index formula = $100*[P_{25}+P_{30}+P_{35}+P_{40}+P_{45}+P_{50}+P_{55}+P_{60})/0.2*\sum_{40}P_{23}]$

The result for the Whipple's Index varies between a minimum of 100 representing no age heaping and a maximum of 500, if all age records had preference for ages ending with 0 or 5 only and no other digits. Between these extremes, reliability of the data can be estimated by using the scales illustrated in Table 5 (Kpedekpo, 1982). Using data from Table 4, the Whipple's Index is estimated at 113.4 which shows that the quality of the data is fairly accurate.

The Myers' Index reflects preferences (or dislikes) for each of the ten digits from 0 to 9. This method assumes that there are no systematic irregularities in reporting of age. The method derives a weighted sum of the number of persons reporting ages ending in each of the terminal digits (0 to 9). It assumes that the blended sum at each terminal digit should be approximately equal to 10 percent of the total blended population. Any deviation from 10 of the blended population is regarded as a digit preference. The extent to which there is a digit preference or digit avoidance is given by the Index of Preference which is

obtained from summing up the absolute sum of deviations for each of the ten terminal digits. The Myers' Index can vary from 0 to 180 where 0 would represent a situation where ages are reported accurately and 180 would represent a situation where ages are reported with the same terminal digit. Tables 4 and 6 illustrate the application of the Myers' method to age data from the 2010/11 ZDHS and from the calculations, the Index of Preference is 6.55 which is rather low. The index indicates that the quality of age reporting is very good.

4.7.2 Reporting of age in individual female interviews

Analysis of the 2010/11 ZDHS data indicates that out of 9171 women that were successfully interviewed, only 0.4% had their ages imputed. Among the 1945 women aged 15 to 19 years, only 2 (0.1%) had their age month imputed. To assess the quality of age reporting during individual interviews by women aged 15 to 49 years, line graphs are plotted for single year age data and for five year age groups. The focus here is on women as this thesis was mainly based on information from women.

Figure 3 indicates that there is no obvious preference of particular digits by women. The line graph however indicates some irregularities. There were fewer women aged 15 years as compared to 16 year olds. This indicates that most of the 15 year olds might have been systematically excluded for eligibility for the individual interview. The number of 18 year old women was also higher than that of 17 year old women. Slight age heaping was noticed at ages 26, 30, 38, 40, 42, 44 and 48 years indicating no specific digit preference. The biggest age heaping was noticed at 35 years. Overall, the age data sets show an expected decreasing trend along ages. This downward trend is also noticeable in figure 4 which shows the expected trend in the distribution by five year age groups.

Table 3: Results of the Age Ratios for Females and Males, Age Ratio Deviations, Sex Ratios, and Sex Ratio First Differences for the Household Population, 2010/11 ZDHS

	FEMALES			MALES				
Age Group	**Number**	**Age Ratio**	**Deviations from 100**	**Number**	**Age ratio**	**Deviations from 100**	**Sex Ratio**	**First Difference**
0-4	2995			2966			99.03	1.40
5-9	2794	96.15	-3.85	2806	96.01	-3.99	100.43	1.77
10-14	2817	115.55	15.55	2879	119.96	19.96	102.20	-6.43
15-19	2082	86.61	-13.39	1994	89.30	-10.70	95.77	-16.06
20-24	1991	102.29	2.29	1587	91.31	-8.69	79.71	2.12
25-29	1811	105.81	5.81	1482	107.86	7.86	81.83	-0.76
30-34	1432	97.55	-2.45	1161	94.05	-5.95	81.08	6.66
35-39	1125	103.78	3.78	987	106.02	6.02	87.73	7.51
40-44	736	81.60	-18.40	701	96.49	-3.51	95.24	-26.61
45-49	679	89.76	-10.24	466	83.51	-16.49	68.63	-15.22
50-54	777	126.75	26.75	415	86.55	-13.45	53.41	36.72
55-59	547	89.09	-10.91	493	129.40	29.40	90.13	-13.19
60-64	451	106.37	6.37	347	90.36	-9.64	76.94	14.42
65-69	301			275			91.36	
70+	712			536			75.28	
			119.79			135.66		148.87
			10.0	0.0	0.0	11.3	0.0	11.5
		Joint Score		**55.6**				

Figure 3: Bar Chart showing Age Ratio Deviations for Females and Males as well as First Differences derived from the Sex Ratios, 2010/11 ZDHS

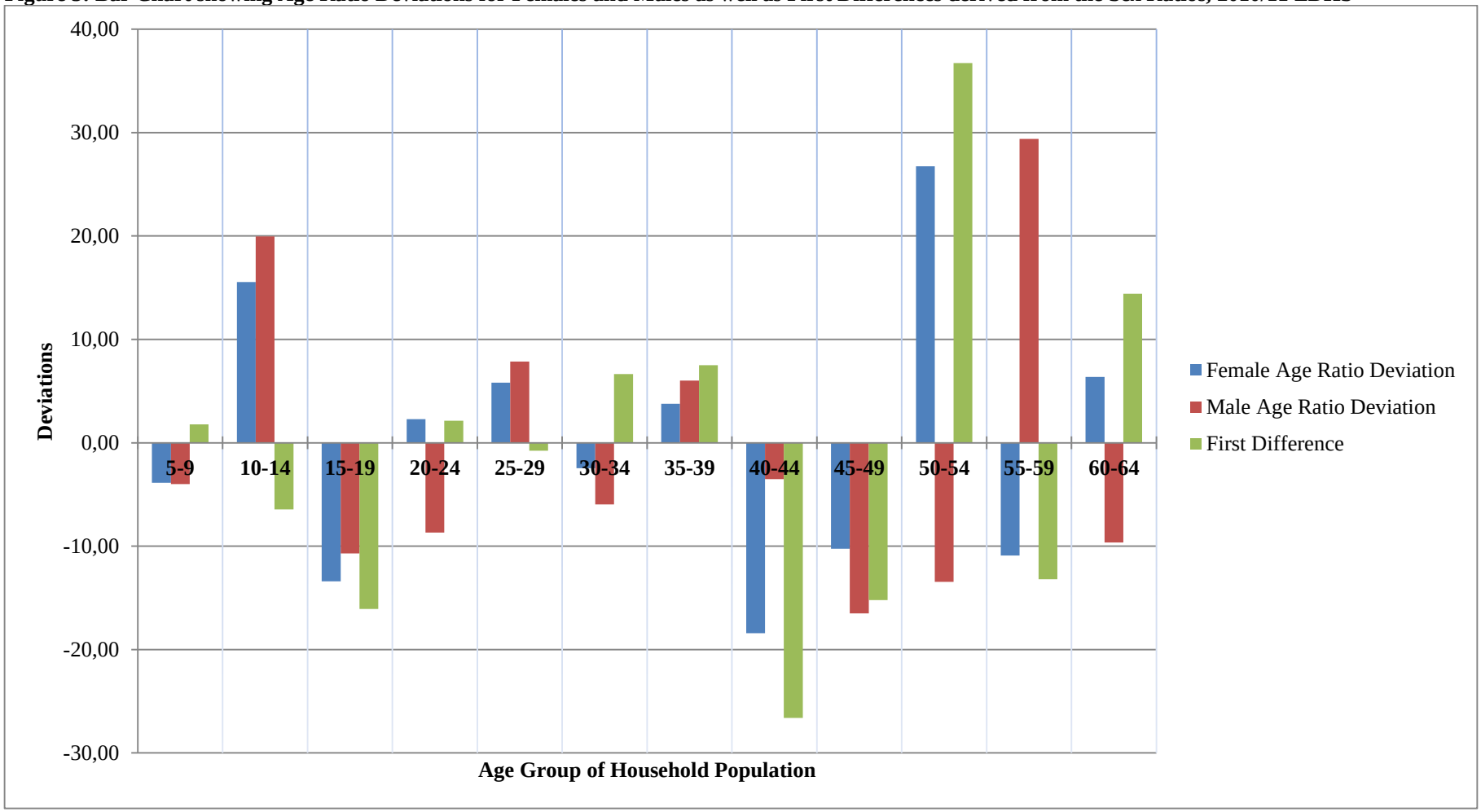


Table 4: Percentage Distribution of De-Facto 2010/11 ZDHS Household Population by Age Group and Age Terminal Digits

	Numbers at Ages Specified							
Terminal Digit	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	Sum of Ages10 to 69	Sum of Ages 20 to 69
0	1298	787	652	420	294	189	3640	2342
1	1103	704	485	251	225	133	2901	1798
2	1135	730	467	334	255	168	3089	1954
3	1154	714	479	235	202	179	2963	1809
4	1006	643	510	197	216	129	2701	1695
5	804	723	578	255	213	167	2740	1936
6	914	711	468	225	252	100	2670	1756
7	783	658	357	250	215	107	2370	1587
8	867	674	419	248	235	130	2573	1706
9	708	527	290	167	125	72	1889	1181

Table 5: Whipple's Index Scales for Estimating the Reliability of Age Data

Quality of the Data	Whipple's Index
Highly Accurate	Less than 105
Fairly Accurate	105-109.9
Approximate	110-124.9
Rough	125-174.9
Very Rough	175+

Table 6: Calculation of the Myers' Method to Age Data for the 2010/11 ZDHS Household Population

Terminal Digit	Sum 10 to 69	Ages 10 to 69 Coefficient	Product	Sum 20 to 69	Ages 20 to 69 Coefficient	Product	Blended Sum	Percentage Distribution	Deviation from 10
0	3640	1	3640	2342	9	21078	24718	10.91	0.91
1	2901	2	5802	1798	8	14384	20186	8.91	-1.09
2	3089	3	9267	1954	7	13678	22945	10.13	0.13
3	2963	4	11852	1809	6	10854	22706	10.02	0.02
4	2701	5	13505	1695	5	8475	21980	9.70	-0.30
5	2740	6	16440	1936	4	7744	24184	10.67	0.67
6	2670	7	18690	1756	3	5268	23958	10.57	0.57
7	2370	8	18960	1587	2	3174	22134	9.77	-0.23
8	2573	9	23157	1706	1	1706	24863	10.97	0.97
9	1889	10	18890	1181	0	0	18890	8.34	-1.66
Sum	27536			17764			226564	100	6.55

Figure 4: Number of Women aged 15 to 49 Years Interviewed during the 2010/11 ZDHS by Single Ages

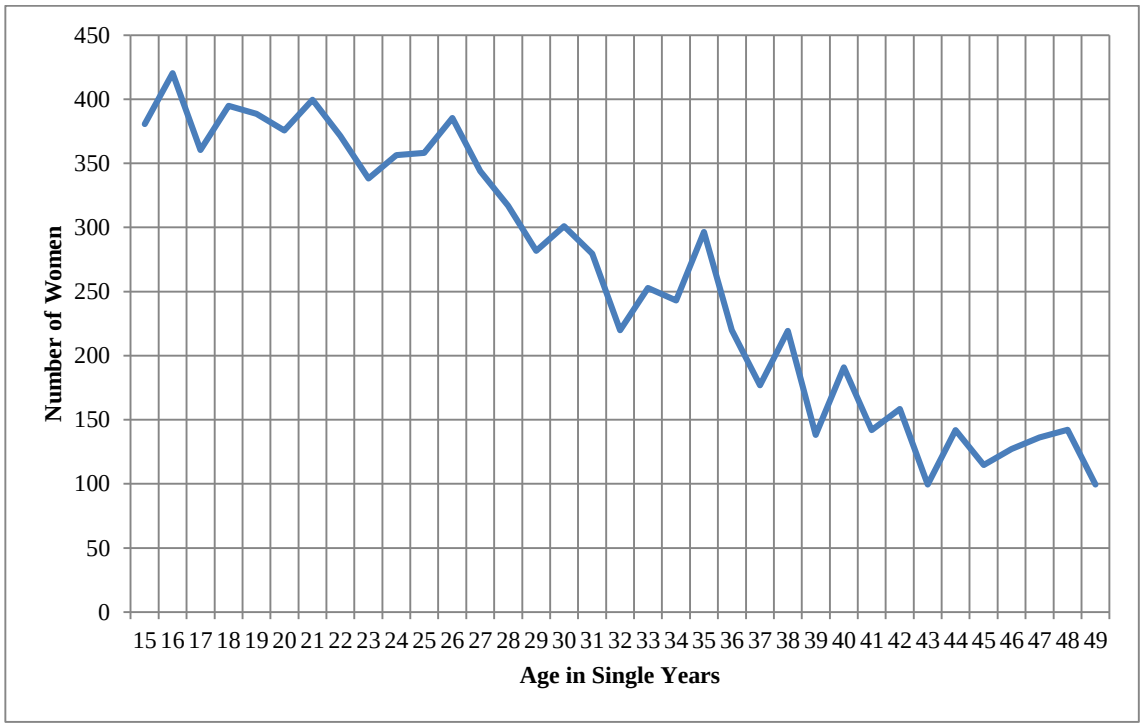
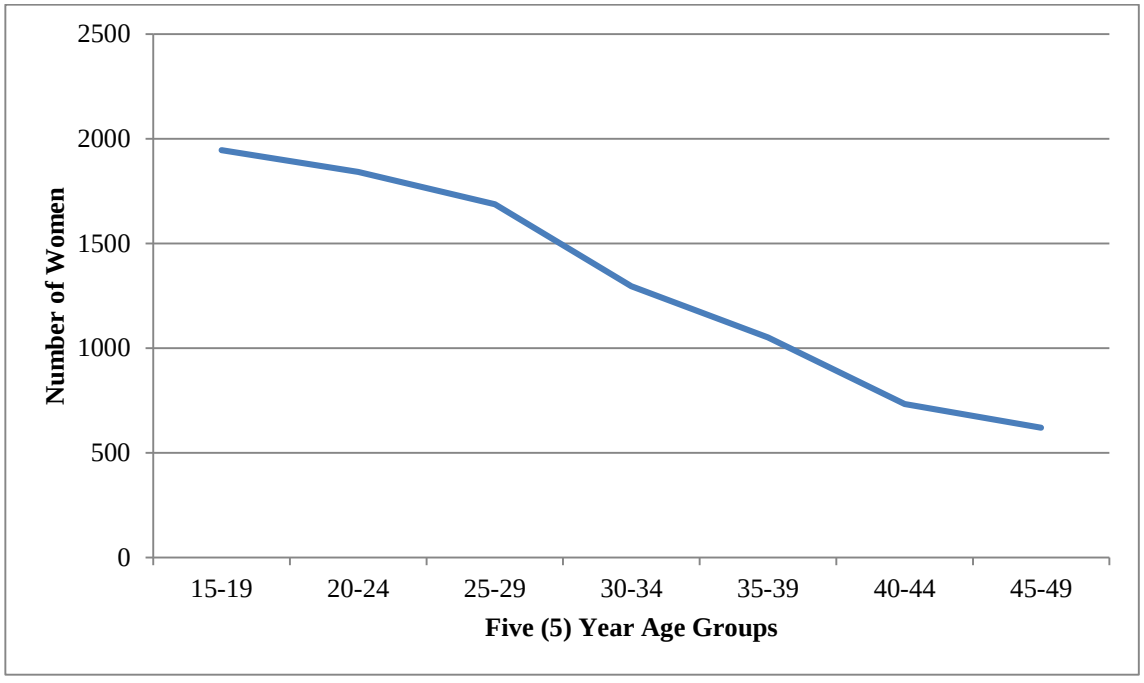


Figure 5: Number of Women aged 15 to 49 Years Interviewed during the 2010/11 ZDHS by 5 Year Age Groups



4.7.3 Discussion on data quality

Although net age misreporting is evident among both females and males as shown in Table 3, this study is mainly focussing on female eligibility for individual interviews. There is evidence that some of the women aged 15 to 19 years old have been systematically included among the 10 to 14 year olds. This systematic exclusion of some women has the potential to affect adolescent women's reproductive health care utilisation estimates. This systematic exclusion is also evidenced in figure 2 where the number of 16 year old women was higher than that of 15 year old women. This may indicate that most of the 15 to 19 year old women who were systematically excluded for eligibility were aged 15 years. Results also indicate that there has been a systematic transfer of women from the 40 to 49 year old brackets to women aged over 50 years of age. This indicates that some women aged 40 to 49 years old were systematically excluded from eligibility for the individual interview. However, such women would still not be eligible for this study as this study focused on adolescent women aged 15 to 19 years.

Myers Index indicates that age reporting provided accurate data during the 2010/11 ZDHS. There is no evidence of age heaping in the data. Age reporting during individual interviews among females appears to be of very good quality. Almost all females reported their ages without imputation. Only two out of 1945 adolescent women aged 15 to 19 years had their birth month imputed. The two adolescents constituted only 0.3% of those that have ever had sex. One (1) had birth during the last five years preceding the survey (0.3% of births by women aged 15 to 19 years). Completeness of data on reproductive health utilisation outcomes considered is found to be very good as there is no missing data. All women interviewed who have ever had sex provided information in contraceptive use during the last 12 months preceding the survey. All the data regarding the place of birth of the last child as well as information regarding use of PNC services was provided.

One of the pointers of good quality data is the level of response rates in a study. Households formed units of the second stage of sampling in the 2010/11 ZDHS. It is crucial to find households that have been sampled occupied and it is similarly vital to successfully interview eligible individuals found at household level. There is a high likelihood of bias if information from unoccupied household differ from that of households with completed questionnaires and the same can be said about completion of individual questionnaires (Rutstein and Bicego,

1990). Out of a total of 10 828 households selected for the sample in the 2010/11 ZDHS, 96% were successfully interviewed. Successful completion of individual questionnaires yielded a 93% and 86% response rate for females and males respectively. This is an increase from 90% and 82% for women and men respectively during the 2005/06 ZDHS survey (ZIMSTAT & ICF International Inc., 2012). With these high response rates, it is less likely to have a substantial effect on adolescent reproductive health utilisation estimates from the 2010/11 ZDHS.

In conclusion, the errors found in the 2010/11 ZDHS are not big enough to grossly affect estimation of the levels of reproductive health utilisation by adolescent women. The highest net age misreporting is evidenced among those aged between 40 and 59 years. These are women not eligible for this study.

CHAPTER 5: PROFILE OF THE RESPONDENTS

5.1 Contraceptive Use

A total weighted sample of 457 non-pregnant adolescent women reported to have had their last sex during the 12 months preceding the 2010/11 ZDHS. Of the 457 adolescent women that reported to have had their last sex within 12 months preceding the survey, 39.4% indicated that they were current users of modern contraceptives. Table 7 shows the percentage distribution of adolescent women who had their last sex during the 12 months preceding the 2010/11 ZDHS by their selected characteristics. Of the adolescent women who had their last sex during the 12 months preceding the 2010/11 ZDHS, 70.4% resided in rural areas. The majority of them were ever married (77.2%), had a large age difference with their husbands or partners (68.7% with a mean of 7.5 years), were aged 18 to 19 years (64.2% with mean of 17.7 years), had secondary or higher education (63%), had high autonomy within their households (59.5%), and had given birth to one or more children (59.5% with mean of 0.66 children). About a third of the adolescent women were affiliated to either Protestant or Pentecostal (33.8%) religious denominations, whereas those affiliated to Traditional and Apostolic Sect religion constituted 43.7% of adolescent women. Slightly above one fifth (22.5%) were either Catholic, Muslim, non-affiliated, or belonged to other Christian religions.

Table 7: Percentage Distribution of Adolescent Women who have had Sex during 12 Months preceding 2010/11 ZDHS by Selected Characteristics.

Characteristics	% (N=457)	Characteristics	% (N=457)
Age		**Residence**	
15 to 17 Years	**35.8**	Urban	**29.6**
18 to 19 Years	**64.2**	Rural	**70.4**
Mean Age	***17.7***	**Media Access**	
Marital Status		No Access	**35.7**
Never Married	**22.8**	Medium Access	**38.9**
Ever Married	**77.2**	High Access	**25.4**
Age Difference with Partner		**Wealth Index**	
Large	**68.7**	Low	**41.9**
Small / None	**31.3**	Medium	**21.9**
Mean Difference	***7.5***	High	**36.2**
Parity		**Level of Autonomy**	
None	**40.5**	Low Autonomy	**40.5**
One or More Pregnancies	**59.5**	High Autonomy	**59.5**
Mean No. of Children	***0.66***	**Contraceptive Use**	
Education		Modern	**39.4**
None/Primary	**37.0**	Non-Modern or None	**60.6**
Secondary or Higher	**63.0**		

Characteristics	% (N=457)	Characteristics	% (N=457)
Religious Affiliation		Total	**100.0**
Protestant/Pentecostal	**33.8**		
Traditional/Apostolic Sect	**43.7**		
Catholic/Muslim/None/Other‡	**22.5**		

‡ Othe include any other Christian groups.

About a quarter of adolescent women (25.4%) had high access to media as compared to 35.7% and 38.9% who had no access to media and those who had medium access to media respectively. With regard to the household wealth index, close to two-fifths of adolescent women (41.9%) had low wealth and those with medium and high wealth constituted 21.9% and 36.2% respectively. Of the 457 adolescent women that reported having had their last sex during the 12 months prior to the survey, 39.4% reported that they were modern contraceptives users.

5.2 Use of Health Facility for Childbirth and PNC

A total of 660 women reported to have had their last birth as an adolescent during the past five years preceding the 200/11 ZDHS. Of the 660 adolescent women who reported giving birth to their last child as an adolescent in the five years preceding the survey, 63.7% reported delivering their last child in a health facility. Those that sought PNC services from skilled personnel constituted 42.6%. However, only 23.9% sought PNC services from skilled health personnel within 48 hours as recommended.

Table 8 shows the percentage distribution of women who had their last child as adolescents during the five years preceding the 2010/11 ZDHS survey by their selected characteristics. Results show that the majority of women (85.9%) were having their first child. One third of the women who reported giving birth to their last child as an adolescent five years preceding the survey gave birth before they turned 18 years. Slightly above half women (54.7%) were age less than 18% and 45.3% were age 20 to 24 years. Their mean age was 19.3 years at the time of the survey (not shown in Table 8). The majority resided in rural areas (73.1%), had attained secondary level education or higher (64.6%), had a large age difference with their partners/spouses (62.2%) and had high autonomy (58.3%). Close to half the women (45%) were affiliated to either a Traditional religion or an Apostolic Sect, whereas 29.8% were either

Protestant or Pentecostal, and the rest were affiliated to either Catholic, Muslim, other Christian religion or no religion. Nearly a third of the women who have had their last child as an adolescent in the five years preceding the survey (33.8%) had high wealth as compared to 44.4% and 21.8% who had low and medium wealth respectively. Twenty-two percent of women who had their last child as an adolescent in the five years preceding the survey had high access to media as compared to 35.2% and 42.8% who had no access and those who had medium access correspondingly.

Table 8: Percentage Distribution of Women who have had their Last Child as an Adolescent in the Five Years preceding the 2010/11 ZDHS Survey by Selected Characteristics.

Characteristics	% (N=660)	Characteristics	% (N=660)
Place of Delivery for Last Child		**Highest Level of Education**	
Health Facility	**63.7**	None/Primary	**35.4**
Home or Other	**36.3**	Secondary or Higher	**64.6**
Utilised PNC Services		**Religious Affiliation**	
PNC Utilised within 48 hours	**23.9**	Protestant/Pentecostal	**9.3**
PNC Utilised after 48 hours	**18.7**	ATR/Apostolic Sect	**25.4**
PNC Not Utilised at all	**57.4**	Catholic/Muslim/Other‡	**65.3**
Age at Birth		**Residence**	
15 to 17 Years	**32.3**	Urban	**26.9**
18 to 19 Years	**67.7**	Rural	**73.1**
Birth Order		**Media Access**	
First Birth	**85.9**	No Access	**35.2**
Second or more Birth	**14.1**	Medium Access	**42.8**
Age Difference with Partner/Spouse		High Access	**22.0**
Large	**62.2**	**Wealth Index**	
Small or None	**37.8**	Low	**44.4**
Marital Status		Medium	**21.8**
Never Married	**11.7**	High	**33.8**
Married	**76.6**	**Level of Women's Autonomy**	
Formerly Married	**11.7**	Low Autonomy	**41.7**
		High Autonomy	**58.3**

‡ Other includes any other Christian groups and those with none.

5.3 Community (Macro/Provincial) Level Characteristics of Adolescent Respondents

Data from the 2010/11 ZDHS reveal a significant variation in the community-level characteristics of the respondents considered for this study. Table 9 shows percentage distribution of community-level characteristics across Provinces or clusters in Zimbabwe. For example, the quality of reproductive health care index which measured the average number

of reproductive health care services considered rendered to women for each province ranged from 4.77 to 6.04. The grand mean centred values ranged from -0.52 to 0.75. Half of the provinces were classified as having low quality of reproductive health care. Slightly above half of adolescent women (55.5%) resided in provinces that were classified as having a low quality of reproductive health care whereas 44.5% lived in provinces classified as having a high quality of health care.

Table 9: Percentage Distribution of Adolescent Women by Community (Provincial) Level Characteristics in Zimbabwe, 2010 DHS.

Characteristic	Percent	All Adolescent Women (N=1945)
Provincial Quality of Reproductive Health Care Index		
• Low	55.5	1080
• High	44.5	865
Provincial Barriers to health care access		
• Low	52.2	1016
• High	47.8	929
Provincial Socio-economic Development Index		
• Low	68.9	1340
• High	31.1	605

Provincial barriers to health care access was measured using a wide range of areas such as ability to go for treatment, affordability, distance to health facility and mobility (transportation) by women across provinces. The proportion of women who report experiencing at least one of the problems in the various areas considered in each province varied from 42.9% to 74.5% (grand mean centred values ranged from -19.50 to 12.10). Six out of 10 provinces (60%) had a high proportion of women with at least one problem accessing health care. About half adolescent women (52.2%) resided in provinces that were classified as having a low barriers to health care access whereas the rest (47.8%) lived in provinces classified as having high barriers to health care access.

The provincial socio-economic development index ranged from -1.499 to 1.693. This was obtained from five variables using a PCA procedure. Out of the 10 provinces, 70% had low levels of socio-economic development. Table 9 indicates that 68.9% of adolescent women resided in provinces that were classified as having a low socio-economic development index whereas 31.1% resided in provinces regarded as having a high socio-economic development index.

CHAPTER 6: LEVELS AND DETERMINANTS OF REPRODUCTIVE HEALTH CARE UTILISATION BY ADOLESCENT WOMEN IN ZIMBABWE

6.1 Patterns of Reproductive Health Utilisation by Adolescent Women

6.1.1 Modern contraceptive use

A total of 457 adolescents reported to have had their last sex within the last 12 months prior to the 2010/11 ZDHS. Out of these 39.4% reported to have used modern contraceptives (See Table 10). Only 0.9% of adolescent women used traditional methods. Figure 6 shows the percentage distribution of adolescent women who utilised reproductive health care services by type of service and province. There was significant variation in current use of modern contraception by adolescent women by province and the proportion ranged from 25% to 51.9%% (see figure 6).

Contraceptive use among adolescent women increased with age of woman, parity, and age difference with partner/spouse. It was also related to residence and marital status. Table 11 shows the means and percentage distribution of adolescent women using modern contraceptives by selected characteristics. The proportion of 18 to 19 year old adolescent women who reported use of modern contraceptives was higher than that of their 15 to 17 years old counterparts (44% vs 31.1%) with mean age of modern contraceptive users at 18 years.

About one-fifth of the never married (21.1%) were current modern contraceptive users and the proportion of those ever married using contraceptives was 1.5 times higher. Modern contraceptive use among adolescent women residing in rural areas was higher than for those residing in urban areas (41.9% vs. 33.3%). The proportion of adolescent women in the study with one or more children who were current users of modern contraceptives was eight times higher than that of their counterparts with no children ever born (61% vs. 7.6%). The proportion of adolescent women with a small or no age difference with their husbands/partners was lower with 34.7% as compared to 42.4% among adolescent women with a large age difference. Individual-level variables for adolescent women that were not statistically

associated with modern contraceptive use included the level of education, level of autonomy, household wealth index, religion and level of media access. A test for collinearity indicated that none of the independent variables were significantly correlated.

Table 10: Levels of Adolescent Women's Reproductive Health Care Use in Zimbabwe by Type of Reproductive Health Care.

Type of Reproductive Health Care	Number Used		Not Used		Total
	Number	Percent	Number	Percent	
Modern Contraceptives	180	39.4	277	60.6	457
Health Facility for Delivery of Last Child	420	63.7	240	36.3	660
Postnatal Service Care	158	23.9	502	76.1	660

Table 11: Means and Percentage of Adolescent Women in Sexual Union using and not using Modern Contraceptives by Selected Characteristics (N=457).

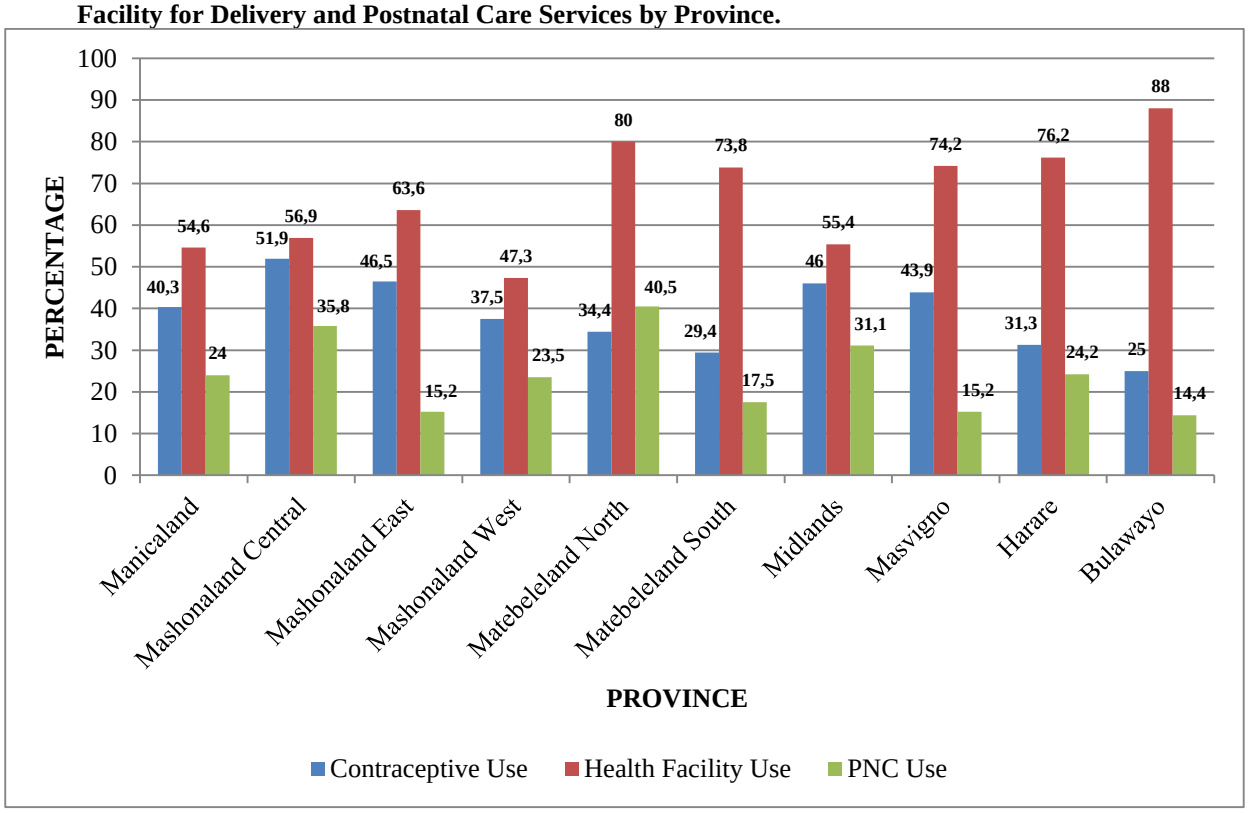
Characteristics		**Using**	**Not Using**
Age	15 to 17 Years	**31.1*** **	**68.9**
	18 to 19 Years	**44.0**	**66.0**
	Mean Age	***18.0***	
Marital Status	Never Married	**21.2*** **	**78.8**
	Ever Married	**44.6**	**55.4**
Age Difference with Partner	Large	**42.4*** **	**57.6**
	Small/None	**34.7**	**65.3**
	Mean Age Difference	***7.5***	
Parity	First Birth	**7.6*** **	**92.4**
	Second or More Births	**61.0**	**39.0**
	Mean Parity	***1.02***	
Education	None/Primary	**43.8**	**56.2**
	Secondary or Higher	**36.8**	**63.2**
Religious Affiliation	Protestant/Pentecostal	**33.8**	**66.2**
	Traditional/Apostolic Sect	**42.5**	**57.5**
	Catholic/Muslim/None/Other‡	**38.8**	**61.2**
Residence	Urban	**33.3*** **	**66.7**
	Rural	**41.9**	**58.1**
Media Access	No Access	**35.6**	**64.4**
	Medium Access	**41.6**	**58.4**
	High Access	**41.4**	**58.6**
Household Wealth Index	Low	**40.3**	**59.7**

Characteristics		Using	Not Using
	Medium	**42.0**	**58.0**
	High	**37.0**	**63.0**
Level of Autonomy	Low Autonomy	**38.9**	**61.1**
	High Autonomy	**40.2**	**59.8**

*****=p<0.05**

ł Other Religions include any other Christian religion

Figure 6: Percentage Distribution of Adolescent Women's Utilising of Modern Contraceptives, Health Facility for Delivery and Postnatal Care Services by Province.



6.1.2 Use of health facility for childbirth

A total of 660 women reported to have given birth to their last child as adolescents during the five years preceding the survey. Of these women, 63.7% use a health facility to give birth to the last child (see Table 10). This proportion differed significantly by province as shown in figure 6. The proportion of women who used a health facility for delivery of their last child ranged from 47.3% in Mashonaland West province to 88% in Bulawayo province. Use of health facility for delivery of their last child as adolescents during the five years preceding the

survey was correlated with age at birth, birth order, education, religion, media access, household wealth and level of autonomy. Results shown in Table 12 indicate that about two thirds of women whose age at birth was between 18 and 19 years (67.1%) delivered their last child as adolescents in a health facility as compared to 56.3% of those whose age at birth was less than 18 years. The proportion of women using the health facility for birth of last child as adolescents was 73.5% among those with secondary school level or higher and 53.9% among those with primary level or no formal education at all.

Slightly above two thirds of women who were having their first birth as adolescents (67.4%) used a health facility to deliver their last child as compared to 40.9% of those that already had one or more births prior to the birth of their last child. The proportion of women using the health facility for delivery as adolescents was highest among those affiliated to either Protestants or Pentecostals (77.0%) as compared to 57.2% among those affiliated to Traditional or Apostolic Sect, and 59.3% among the other religions. Almost eight-tenths of women residing in urban areas delivered their last child in a health facility as adolescents as compared to 57.9% of those residing in rural areas.

The proportion of women who delivered their last child at the health facility as adolescents increased with the level of media access. Slightly above eight in ten women with high access to media delivered at the health facility as adolescents as compared to 49.1% with no media access and 65.6% with medium access to media. Furthermore, 81.6% of women who delivered in a health facility as adolescents had high wealth as compared to 64.6% and 49.5% of those in the medium and low household wealth categories respectively. About three quarters of women who delivered in a health facility as adolescents (74.0%) had high autonomy as compared to about half of those that had low autonomy (49.5%).

Table 12: Percentage Distribution Utilising Health Facility for Delivery and PNC Services by Skilled Health Personnel within 48 hours from Time of Delivery, by Selected Background Characteristics (N=660).

Characteristics		Health facility for Delivery	Postnatal Care
Age at Birth	15 to 17 Years	**56.3*** **	**21.1**
	18 to 19 Years	**67.1**	**25.1**
Marital Status	Never Married	**66.2**	**31.2**
	Married	**63.4**	**23.7**
	Formerly Married	**62.8**	**18.2**
Age Difference with Partner	Large	**62.8**	**21.7**
	Small/None	**65.1**	**27.3**
Birth Order	First Birth	**24.9*** **	**24.9**

Characteristics		Health facility for Delivery	Postnatal Care
	Second or More Births	**17.2**	**17.2**
Education	None/Primary	**46.2*** **	**17.9*** **
	Secondary or Higher	**73.5**	**27.2**
Religious Affiliation	Protestant/Pentecostal	**77.0*** **	**31.6*** **
	Traditional/Apostolic Sect	**57.2**	**19.6**
	Catholic/Muslim/None/Other‡	**59.3**	**22.2**
Residence	Urban	**79.8*** **	**30.9*** **
	Rural	**57.9**	**21.4**
Media Access	No Access	**49.1*** **	**17.2*** **
	Medium Access	**65.8**	**22.0**
	High Access	**83.4**	**37.9**
Household Wealth Index	Low	**49.5*** **	**20.5*** **
	Medium	**64.6**	**20.1**
	High	**81.6**	**30.8**
Level of Autonomy	Low Autonomy	**49.5*** **	**16.0*** **
	High Autonomy	**74.0**	**29.4**

*****=p<0.05**

‡ Other Religions include any other Christian religion

6.1.3 Use of PNC services

Out of the 660 women who delivered their last child as adolescent women in the five years preceding the 2010/11 ZDHS, 42.6% were health checked by skilled health personnel after delivery. This proportion does not consider the timing of the health check by the skilled health personnel.

It is crucial that women be health checked for any signs of early postpartum complications through physical examination and health monitoring by qualified health personnel within 48 hours after delivery. PNC service use in this study refers to a health check by qualified health personnel within the recommended 48 hours after delivery (ZIMSTAT & ICF International Inc., 2012). Only 23.9% of women reporting to have delivered a child as an adolescent in the five years preceding the survey had utilised the PNC services. This is an indication of under-utilisation of PNC reproductive health services by adolescent women in Zimbabwe who gave birth to the last child during the five year preceding the survey. More than half the women in the sample (57.4%) did not utilise PNC by skilled health personnel at all.

Utilisation of PNC service refers only to women who were health checked by qualified skilled health personnel within 48 hours after delivery of their last child. Utilisation of PNC services by women who delivered their last child as adolescents in the five years preceding the survey varied significantly across provinces in Zimbabwe. Figure 6 shows the percentage

distribution of women who utilised PNC services within 48 hours after delivery of their last child during the five years prior to the survey by province. The provincial proportion of PNC service use ranged from 14.4% in Manicaland province to 40.5% in Matebeleland South province.

Table 12 shows that the never married and the formerly married adolescent women were about one and half times more likely to have utilised PNC services by skilled health personnel within 48hrs than the married. The proportion of adolescents utilising PNC services by skilled personnel within 48 hours was associated with education, residence, religion, media access, household wealth and level of autonomy. The proportion who utilised PNC services was 27.2% among those with secondary or higher education and 17.9% among those with primary or no formal education. Utilisation of PNC services was about one and half times higher than among those residing in urban areas than those residing in rural areas (30.9% vs. 21.4%).

With regard to religious affiliation, utilisation of PNC services was highest among women affiliated to Protestant and Pentecostal religion with 31.6%. The proportion of women affiliated to the Traditional religions and Apostolic Sect religion who utilised PNC services after delivery of their last child was the lowest at 19.6% and this was followed by 22.2% for those affiliated to Catholic, other religions and those with no religion. The proportion of adolescent women utilising PNC by health personnel within 48 hours increased with the level of access to media. The proportion of those using PNC by health personnel within 48 hours was more than two times higher among those with high access to media than those with no access at all (37.9% vs. 17.2%) whereas only 22% of those with medium access to media used PNC services.

About 31% of women in the high household wealth category used PNC services by health personnel within 48 hours as compared to 20.1% and 20.5% of those in the medium and low household wealth category. With regard to level of autonomy, the proportion of women using PNC services was 29.4% among women with high level of autonomy as compared to 16% among those that had low autonomy.

6.2 Determinants of Reproductive Health Care Utilisation by Adolescent Women

6.2.1 Contraceptive use

Table 13 shows results from the logistic regression analysis determining an association between individual-level variables and modern contraceptive use by adolescent women in Zimbabwe. In the unadjusted model, results indicate that modern contraceptive use was associated with age, marital status, parity residence and level of media access.

With regard to age, the current use of modern contraceptives by adolescent women increased with age. The 18 to 19 years olds were more likely to be current users of modern contraceptives than their 15 to 17 year old counterparts (Odds ratio, 1.749). The ever married were about three times more likely to be modern contraceptive users than the never married (Odds ratio, 2.939). The likelihood of an adolescent woman with one or more children ever born using modern contraceptives was almost twenty-fold. Residing in a rural area also increased the odds of modern contraceptive use among adolescent women (Odds ratio, 1.451). Medium and high access to media also increased the odds of contraceptive use (Odds ratios, 1.498; 1.470 respectively). All other individual and household variables were not statistically significant at this level.

In the adjusted model, the statistical significance of age and marital status disappeared whereas that of parity, residence and level of media access remained. Having one or more children ever born increased the use of modern contraceptives almost twelve-fold whereas the likelihood of use of modern contraceptives was higher for adolescent women with medium and high media access as compared to adolescent women with no media access (Odds ratios, 1.661; 1.833 respectively).

Table 13: Odds Ratios showing Association between Micro-level Variables and Use of Modern Contraceptives by Adolescent Women, 2010 ZDHS.

Individual Level Variables	Unadjusted (Univariate) Model		Adjusted Model	
	Odds Ratio	**95% CI**	**Odds Ratio**	**95% CI**
Age				
15 to 17 years	1		1	
18 to 19 years	1.749***	1.168 – 2.620	1.057	0.557 – 2.007

Individual Level Variables	Unadjusted (Univariate) Model		Adjusted Model	
	Odds Ratio	**95% CI**	**Odds Ratio**	**95% CI**
Marital Status				
Never Married	1		1	
Ever Married	2.939***	1.761 – 4.904	1.386	0.208 – 2.564
Parity				
None	1		1	
One or More	19.493***	16.697 -23.521	11.684***	8.917 – 15.073
Age Difference with Spouse				
Large	1		1	
Small	0.750	0.465 – 0.210	1.130	0.615 – 2.076
Education				
None/Primary	1		1	
Secondary or More	0.755	0.513 – 1.112	0.963	0.510 – 1.820
Religion				
Protestant/Pentecostal	1		1	
Traditional/Apostolic Sect	1.348	0.875 – 2.078	0.943	0.492 – 1.810
Catholic/Muslim/None/Other	1.149	0.686 – 1.925	0.715	0.350 – 1.675
Residence				
Urban	1		1	
Rural	1.451***	1.053 – 2.210	1.530***	1.127 – 3.713
Media Access				
No Access	1		1	
Average Access	1.498***	1.138 – 2.411	1.661***	1.115 – 2.228
High Access	1.470***	1.078 – 2.471	1.833***	1.035 – 2.518
Household Wealth				
Low	1		1	
Medium	1.064	0.651 – 1.738	1.500	0.716 – 3.143
High	0.866	0.565 – 1.329	1.324	0.564 – 3.106
Autonomy				
Low Autonomy	1		1	
High Autonomy	1.028	0.647 – 1.634	1.073	0.611 – 1.883
Constant			-2.567	
Percentage Predicted Correctly			70.9	
Nagelkerke R Square			0.384	
-2 Log Likelihood			411.375	

*****=p<0.05; CI=Confidence Interval**

ł Other Religions include any other Christian religion

Table 14: Correlation Matrix showing Correlation Coefficients between Individual-level Variables used in the Logistic Regression for Use of Health Facility for Delivery and PNC by Women who had their Last Birth as Adolescents during the Five Years prior to the 2010 ZDHS.

	Age at Birth	Marital Status	Birth Order	Age-Difference[2]	Education	Religion	Residence	Media Access	Wealth Index	Autonomy
Age at Birth	1									
Marital Status	-0.013	1								
Birth Order	0.219*	0.067	1							
Age Difference[3]	0.115*	-0.073	-0.032	1						
Education	0.238*	-0.033	-0.054	0.023	1					
Religion	0.024	0.017	0.110*	0.110*	-0.097*	1				
Residence	-0.072	0.008	-0.009	-0.014	-0.240*	0.118*	1			
Media Access	0.046	-0.027	-0.070	0.040	0.257*	-0.110*	-0.395*	1		
Wealth Index	0.096*	-0.043	-0.021	-0.017	0.303*	-0.111*	-0.596*	0.524*	1	
Autonomy	0.030	0.025	-0.028	-0.032	0.153*	-0.027	-0.006	0.051	0.062	1

[2] This is the Age difference with the respondent's spouse/partner.

[3] Same as footnote 2.

6.2.2 Use of health facility for delivery

Table 14 presents a correlation matrix which shows correlation coefficients to determine the strength and direction of relationship between micro-level variables. The matrix was also used to determine the existence of multi-collinearity which should be considered before embarking on multivariate regression analysis. Correlation coefficients of less than 0.7 are usually regarded as showing a weaker relationship and hence the results in Table 14 indicate that there is no threat of multi-co linearity.

Table 15 shows the logistic regression results indicating micro-level variables associated with utilisation of health facility for delivery by adolescent women. From the ten (10) individual-level variables analysed, a total of seven micro-level variables were significantly associated with use of health facility for delivery. These variables included age at birth, birth order, and level of education, religion, level of media access, level of household wealth and level of autonomy. Women who gave birth to their last child during the five years preceding the survey when aged between 18 and 19 years were 1.7 times more likely to have delivered in a health facility than those who were aged less than 18 years. Those that were delivering a second or more birth order child were less likely to utilise the health facility for delivery of their last child (Odds ratio, 0.3). Women with secondary education or more were 1.8 times more likely to have given birth in a health facility as an adolescent during the five years preceding the survey than those with primary or no education. With regard to religion, women affiliated to either Traditional or Apostolic Sect religion, and those that were affiliated to Catholic, Muslim, none and others were less likely to have used a health facility for delivery as adolescents (Odds ratio; 0.6 respectively).

Use of health facility for delivery increased with an increase in the level of media access for women who delivered their last child as adolescents during the five years preceding the survey. Women with high level of access to media were more than twice as likely to have delivery of their last child as adolescents in a health facility (Odds ratio, 2.4) as compared to those with no access to media.

The odds of utilising the health facility for delivery also increased with an increase in wealth. Women with medium household wealth and those with high household wealth were 1.6 and 2.5 times respectively, to have delivered their last child as adolescents in a health

facility. The odds of utilising the health facility for delivery of last child were higher for women with a high level of autonomy (Odd ratio, 2.9).

6.2.1 Use of PNC services

Table 16 shows the results of the logistic regression analysis of the association between micro-level variables, and utilisation of PNC services by women who gave birth to their last child as adolescents during the five years preceding the survey. Model 1 involved a multivariate analysis of all the ten individual level variables. From this model, only the level of media access and level of autonomy were positively associated with use of PNC services. Women who had high media access were more than twice as likely to have used PNC services as their counterparts with no media access. There was no significant difference between those that had average media access and those that had no media access. The odds of PNC service use by women with high autonomy was 2.2. Model 2 involved only individual level variables that were statistically significant at bivariate level. Results from this model indicate a similar relationship for level of media access and level of autonomy. Women with high access to media were more likely to use PNC services (Odds ratio, 2.5) and those with high autonomy had higher odds of use. Nonetheless, religious affiliation was associated with PNC service use in this model. Women affiliated to both Traditional and Apostolic Sect were significantly less likely to use PNC services as compared to those affiliated to Protestant or Pentecostal (Odds ratio, 0.626). The third model (Model 3) involved removing household wealth index and this improved the fit of the model. However, results show a similar relationship to that of model 2. High media access and high autonomy had a positive relationship with use of PNC services whereas belonging to Traditional and Apostolic Sect seem to mitigate the likelihood of use of PNC services by women.

Table 15: Odds Ratios showing Association between Individual and Household level Variables and Use of Health Facility for Delivery of Last Child by Adolescent Women during the Five Years preceding the Survey, Zimbabwe.

Individual and Household Level Variables	Model 1		Model 2	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Age at Birth				
Less than 18 years	1		1	
18 to 19 Years	1.657***	1.104 - 2.487	1.654***	1.107 – 2.473
Marital Status				
Never Married	1			

Individual and Household Level Variables	Model 1		Model 2	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Married	1.112	0.610 – 2.027		
Widowed/Separated	1.089	0.509 – 2.331		
Birth Order				
First Birth	1		1	
Second or More Births	0.281***	0.166 – 0.474	0.286***	0.170 – 0.481
Age Difference with Spouse				
Large	1			
Small	0.999	0.676 – 1.478		
Education				
None/Primary	1		1	
Secondary or More	1.781***	1.208 – 2.627	1.793***	1.216 – 2.643
Religion				
Protestant/Pentecostal	1		1	
Traditional/Apostolic Sect	0.604***	0.380 – 0.958	0.601***	0.382 – 0.948
Catholic/Muslim/None/Others	0.607***	0.361 – 0.981	0.599***	0.359 – 0.999
Residence				
Urban	1			
Rural	0.814	0.463 – 1.431		
Media Access				
No Access	1		1	
Average Access	1.153	0.761 – 1.747	1.163	0.769 – 1.759
High Access	2.326***	1.252 – 4.319	2.372***	1.282 – 4.390
Household Wealth				
Low	1		1	
Medium	1.542	0.967 – 2.459	1.595***	1.008 – 2.525
High	2.288***	1.271 – 4.120	2.534***	1.532 – 4.192
Autonomy				
Low Autonomy	1		1	
High Autonomy	2.897***	2.002 – 4.194	2.886***	2.001 – 4.162
Constant	0.528		0.473***	
Percentage Predicted Correctly	73.8		78.9	
Hosmer and Lemeshow Test (p-value)	0.424		0.460	
Nagelkerke R Square	0.294		0.323	
Overall Model (p-value)	0.000		0.000	

*****=p<0.05; CI=Confidence Interval**

ł Other Religions include any other Christian religion

Table 16: Odds Ratios showing Association between Individual and Household level Variables and Use of PNC services after Delivery of Last Child by Adolescent Women during the Five Years preceding the Survey, Zimbabwe.

Individual Level Variables	Model 1		Model 2		Model 3	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Age at Birth						
Less than 18 years	1					
18 to 19 Years	1.184	0.766 – 1.830				
Marital Status						
Never Married	1					
Married	0.749	0.421 – 1.332				
Widowed/Separated	0.541	0.246 – 1.190				
Birth Order						
First Birth	1					
Second or More Births	0.710	0.387 – 1.302				
Age Difference with Spouse						
Large	1					
Small	1.212	0.817 – 1.798				
Education						
None/Primary	1		1		1	
Secondary or More	1.164	0.742 – 1.826	1.237	0.800 – 1.912	1.221	0.793 – 1.879
Religion						
Protestant/Pentecostal	1		1		1	
Traditional/Apostolic Sect	0.696	0.443 – 1.093	0.626***	0.412 – 0.986	0.630***	0.411 – 0.998
Catholic/Muslim/None/Others	0.678	0.411 – 1.119	0.685	0.419 – 1.120	0.687	0.420 – 1.123
Residence						
Urban	1		1		1	
Rural	0.871	0.523 – 1.451	0.895	0.539 – 1.486	0.911	0.583 – 1.423
Media Access						
No Access	1		1		1	
Average Access	1.162	0.717 -1.882	1.183	0.733 – 1.909	1.156	0.725 – 1.843
High Access	2.445***	1.349 – 4.429	2.480***	1.381 – 4.455	2.423***	1.412 – 4.157

Individual Level Variables	Model 1		Model 2		Model 3	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Household Wealth						
Low	1		1		1	
Medium	0.814	0.479 – 1.385	0.806	0.476 – 1.367		
High	0.906	0.511 – 1.609	0.922	0.523 – 1.624		
Autonomy						
Low Autonomy	1		1		1	
High Autonomy	2.215***	1.471 – 3.336	2.196***	1.466 – 3.291	2.198***	1.467 – 3.292
Constant	-1.498 (0.479)***		-1.691 (0.389)***		-1.757 (0.359)***	
Percentage Predicted Correctly	77.1%		76.5%		76.1%	
Hosmer and Lemeshow Test (p-value)	0.178		0.178		0.223	

*****=p<0.05; CI=Confidence Interval**
ł Other Religions include any other Christian religion
NI – Not Included
NA – Not Applicable

CHAPTER 7: CONTEXTUAL INFLUENCES OF ADOLESCENT WOMEN'S REPRODUCTIVE HEALTH CARE UTILISATION IN ZIMBABWE

7.1 Introduction

This chapter addresses the third and the fourth objectives of this study. The third objective of this study was to examine the independent effects of macro-level variables on adolescent women's reproductive health care utilisation in Zimbabwe. The fourth objective was to establish the moderating effects of the macro-level variables on the association between micro-level variables and contraceptive use by adolescent women in Zimbabwe.

To achieve the third objective, the use of multilevel modelling for binary outcomes was built as it is appropriate for examination of the independent impacts of community (macro) level and individual (micro) level variables on adolescent women's reproductive health care utilisation. Multilevel modelling involves the inclusion of individual, household and community-level variables in regression equations with individuals as units of analysis. This technique allows the examination of community-level effects whilst controlling for individual level confounders and vice versa (Goldstein, 1995).

A total of six multilevel logistic regression models were estimated. The first model, which is an empty model, estimated the variance in the probability of utilising reproductive health care (modern contraceptives use, use of health facility for delivery and use of PNC services) by adolescent women observed between and within provinces. The second model added individual-level variables as fixed effects. The third model included household-level variables only whereas the fourth model added macro-level variables only as fixed effects. The fifth model combined both the micro-level variables, as well as macro-level fixed effects and the last model (model 6) only considered individual and macro-level variables that were significantly associated with the reproductive health care utilisation outcome by adolescent women in the fifth model. Interaction terms are introduced at this level. The equation for the multilevel model for reproductive health care utilisation by adolescent women was as follows for respective reproductive health care utilisation outcome:

Level 1 Model:

Modern contraceptive use

Probability of using modern contraceptives by adolescent women = P

So: $\log[P/(1-P)] = \beta_0 + \beta_1*(\text{Age}) + \beta_2*(\text{Marital Status}) + \beta_3*(\text{Parity}) + \beta_4*(\text{Age Difference with Spouse}) + \beta_5*(\text{Education}) + \beta_6*(\text{Religion – Traditional/Apostolic}) + \beta_7*(\text{Religion – Catholic/Other}) + \beta_8*(\text{Residence}) + \beta_9*(\text{Media Access - Medium}) + \beta_{10}*(\text{Media Access – High}) + \beta_{11*}(\text{Household Wealth Index - Medium}) + \beta_{12}*(\text{Household Wealth Index – High}) + \beta_{13}*(\text{Level of Autonomy})$

Use of health facility for delivery and PNC service use

Probability of using the health facility for childbirth and utilisation of postnatal care by adolescent women = P

So:

$\log[P/(1-P)] = \beta_0 + \beta_1*(\text{Age at Birth}) + \beta_2*(\text{Birth Order}) + \beta_3*(\text{Marital Status – Married/Cohabiting}) + \beta_4*(\text{Marital Status – Widowed/Separated/Divorced}) + \beta_5*(\text{Education}) + \beta_6*(\text{Religion – Traditional/Apostolic}) + \beta_7*(\text{Religion – Catholic/Other}) + \beta_{8*}(\text{Residence}) + \beta_9*(\text{Media Access - Medium}) + \beta_{10}*(\text{Media Access – High}) + \beta_{11*}(\text{Household Wealth Index - Medium}) + \beta_{12}*(\text{Household Wealth Index – High}) + \beta_{13}*(\text{Level of Autonomy})$

Level 2 Model (similar for all reproductive health care outcomes)

$\beta_0 = \gamma_{00} + \gamma_{01}*(\text{Provincial Quality of Reproductive Health Care}) + \gamma_{02}*(\text{Provincial Barriers to health care access}) + \gamma_{03}*(\text{Provincial Socio-economic Development Index}) + U_0$

Moderating effects of the macro-level variables on the association between micro-level variables, and contraceptive use refers to the cross-level interaction between the two domain variables. It indicates the magnitude at which the micro-level variable is influenced by the macro-level variables to influence the level of contraceptive use by adolescent women. To establish the moderating effects of the macro-level variables on the association between micro-level variables and reproductive health care utilisation by adolescent women in

Zimbabwe, micro-level variables that were significantly associated with reproductive health care utilisation by adolescent women were identified. These were then checked whether their association could be modified by any macro level (provincial) variables that were associated with each reproductive health care utilisation outcome variable.

7.2 Modern Contraceptive Use

7.2.1 Independent effects of macro-level variables on contraceptive use by adolescent women

The results of the final multilevel logistic regression analysis for use of modern contraceptive use by adolescent women in Zimbabwe are shown in Tables 17 and 18. The tables show coefficients and odds ratios for the fixed effects for all the six models. The first model (model 1) which is an empty model, investigated the intercept and the random variance component of the intercept. Results show a variance coefficient of 0.715 which was significant. This means that a normally distributed random intercept of adolescent women's random contraceptive use has a variance of 0.715. The model had no micro-level variables as well as the macro-level variable indicating that the differences in adolescent contraceptive use between provinces (community) may be attributable to either unobserved micro-level variables or other unobserved macro-level variables. The intra-province correlation coefficient was 17.9%.

Model 2 included the micro-level level variables only. Individual-level variables associated with use of modern contraceptive use by adolescent women included parity and marital status and level of media access. Having one or more children ever born increased odds of use of modern contraceptives by adolescent women (Odds Ratio, 16.593). Adolescent women who were ever married were more than twice as likely to be users of modern contraceptive as compared to those never married (Odds Ratio, 2.877). The odds of use increased with the level of access to media access. Adolescent women with medium access to media were 1.9 times more likely to be users of modern contraceptives that their counterparts with no access to media. The odds were slightly higher for those with high access to media (Odds Ratio 2.212). Surprisingly, socio-economic variables such as level of education and religion were not

associated with adolescent women contraceptive use. The random intercept variance was 0.296 which gave a proportional reduction change of 58.6% from the empty model. With a reduced ICC of 8.3%, clustering of modern contraceptive use by adolescent women was related to the composition of their individual level characteristics.

The effect of household-level variables such as household wealth and level of autonomy were included in model 3. Adolescent women with higher level of autonomy were more likely to be contraceptive users (Odds Ratio, 1.611) and the model has a variance of the random intercept of 0.328 which is not significant. This gives a proportional reduction change in variance of 47.5% from the empty model, a slight increase from the variance estimated in model 2. This means that individual level variables in the model explained some of the variation in adolescent contraceptive use between provinces (clusters). Some of the between cluster variation may also be explained by some unobserved individual characteristics or community level characteristics.

Model 4 included the provincial (macro) level variables but did not include the micro-level (individual and household) variables. The community (province) quality of reproductive health care index was not associated with adolescent use of modern contraceptive. The odds of adolescent women using modern contraceptives increased with an increase in the community (province) barriers to health care access (Odds Ratio, 1.6). The model showed that residing in a community with a high socio-economic development was associated with lower odds of modern contraceptive use (Odds Ratio, 0.5). The variance of the random intercept for this model had been increased to 0.482 and it was not significant. The ICC was also increased to 13.1% when compared to that of model 2. A percentage increase of the ICC from model 2 indicates that the model has not been improved by the inclusion of provincial (community) level variables. However, compared to the empty model, the random intercept variance is still a 32.6% reduction indicating that it is a better fit than the empty model. The results therefore indicate that model 2 is a better explanatory model than model 3 but unexplained variation between provinces still remains.

Model 5 included both the micro-level variables, as well as macro (provincial) level variables. The association of micro individual and household variables was almost similar to that of model 2. The odds of using modern contraceptive by adolescent women with one or more children ever born were slightly reduced to 13.6 from 16.593 in model 1. Adolescent women who were ever married were 2.5 times more likely to be modern contraceptive users

than their never married counterparts. Those odds were also increased by an increase in access to media. Those with medium and high media access were about twice as likely to be modern contraceptive users as compared to those with no media access (Odds Ratio, 1.818; 2.134 respectively). Community-level variables associated with use of modern contraceptives by adolescent women were similar to that of model 4. The odds of use of modern contraceptive were higher in provinces that had high barriers to health care access (Odds Ratio, 2.0). This means that provinces that had a higher barriers to health care access had twice the likelihood of having adolescent women using modern contraceptives (Odds Ratio, 2.010). Although socio-economic development is expected to improve access to reproductive health care, findings from this study indicate otherwise for use of contraceptives by adolescent women in Zimbabwe. Adolescent women residing in provinces with high socio-economic development were less likely to be current users of modern contraceptives (Odds ratio, 0.213). The effect of quality of reproductive health care on adolescent women's modern contraceptive use remains insignificant after controlling for individual level variables.

Including community-level variables in the model and controlling for individual and household-level variables reduced the variance of the random intercept to 0.302. The random intercept is not significant indicating homogeneity across provinces (clusters) even after both micro level individual and macro level contextual variables are considered. The percentage reduction change in variance from the empty model for model 5 is 57.8%. The ICC was reduced to 9.5% but still slightly higher than that of model 2.

The final model (model 6) considered all micro-level variables and macro-level variables that were significantly associated with use of modern contraceptives by adolescent women. An interaction component was also added to the model to help after several cross level interaction checks. This model is also used to answer objective 4 and 5. There was a decrease in the variance component of the random intercept from 0.302 in model 5 to 0.282, both of which were insignificant. The proportional change in variance from the empty model is 60.6%. This reduction implies that model 6 has the best fit. The AIC and the BIC test values also provide a good indication of the best fit as they are the lowest as shown in Tables 16 and 17. The ICC was the lowest with 9.0% indicating that the clustering of use of modern contraceptives by adolescent women was related to both individual level characteristics and community-level characteristics. The only significant individual level variables still significant were parity and marital status of the adolescent woman. Adolescent women with

one or more children ever born had higher odds of use of modern contraceptives than those with no children ever born (Odds ratio, 13.722). The ever married were also more likely to be modern contraceptive users (Odds Ratio, 2.547).

Model 6 also shows that the association between adolescent women's high access to media with of use modern contraceptives by adolescent women was, however, moderated in this model due to the interaction effect from the provincial socio-economic development. The provincial socio-economic development effect on contraceptive use depended on the level of media access.

Independent effects of macro-level variables on use of modern contraceptives by adolescent women

Results in Table 18 indicate that there was only one independent provincial/community-level variable that had an independent effect on adolescent use of modern contraceptives as indicated by the final model (model 6). Mixed results were established on the association between adolescent contraceptive use and some of the provincial-level variables. For example, the odds of use of modern contraceptives increased with residing in provinces (communities) with high barriers to health care access (Odds ratio, 2.211). It should be noted that the provincial barriers to health care access variable was measured using women's reporting of the problems they would experience accessing health care.

Figure 7 indicates the proportional change in percentage by model using model 1 (empty model) as reference. It clearly indicates that model 2 was a better fit than model 3 and 4. However, model 5 which eliminated variables that were not significant and also introduced the interaction component was the best fit. Figure 8 shows the ICC by model. The figure provides a clearer illustration that higher clustering for use of contraceptive methods by adolescent women was found at individual level. Although both individual and provincial characteristics are important in explaining observed provincial variations, individual characteristics were more important than provincial characteristics in influencing modern contraceptive use by adolescent women. However, both Figure 7 and Figure 8 shows that the best model (model 6) is achieved by a combination of both individual and provincial-level characteristics.

Figure 7: Proportional Change in Variance of Adolescent Use of Contraceptives in Zimbabwe by Model using Model 1 (Empty Model) as a Reference, 2010 ZDHS.

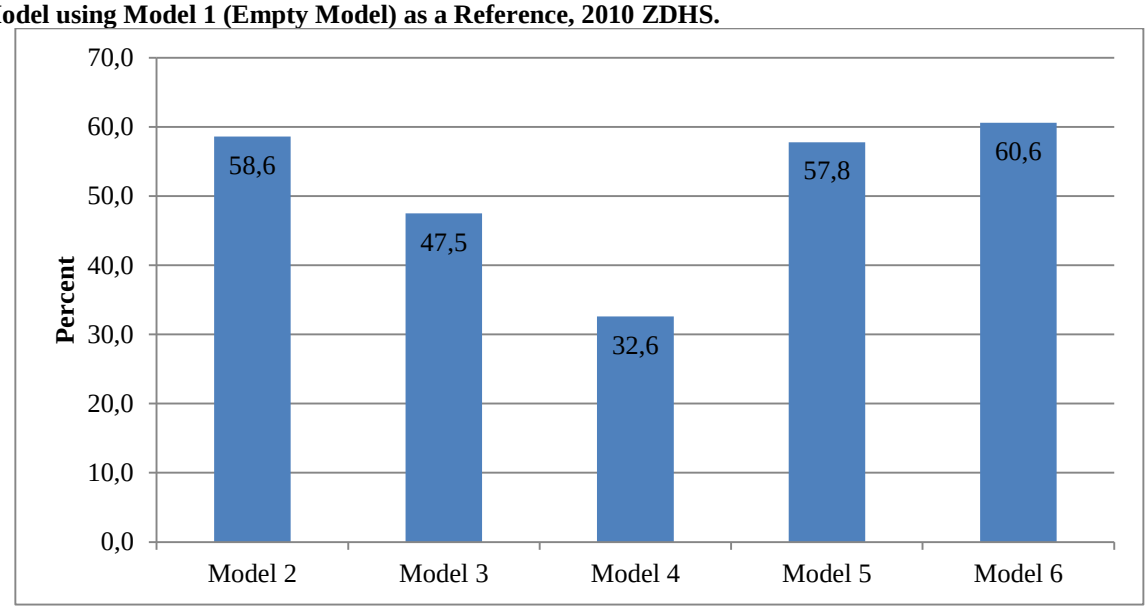


Figure 8: Intra-Class Correlation (ICC) Coefficient for Use of Modern Contraceptives by Adolescent Women in Provinces in Zimbabwe, 2010 ZDHS.

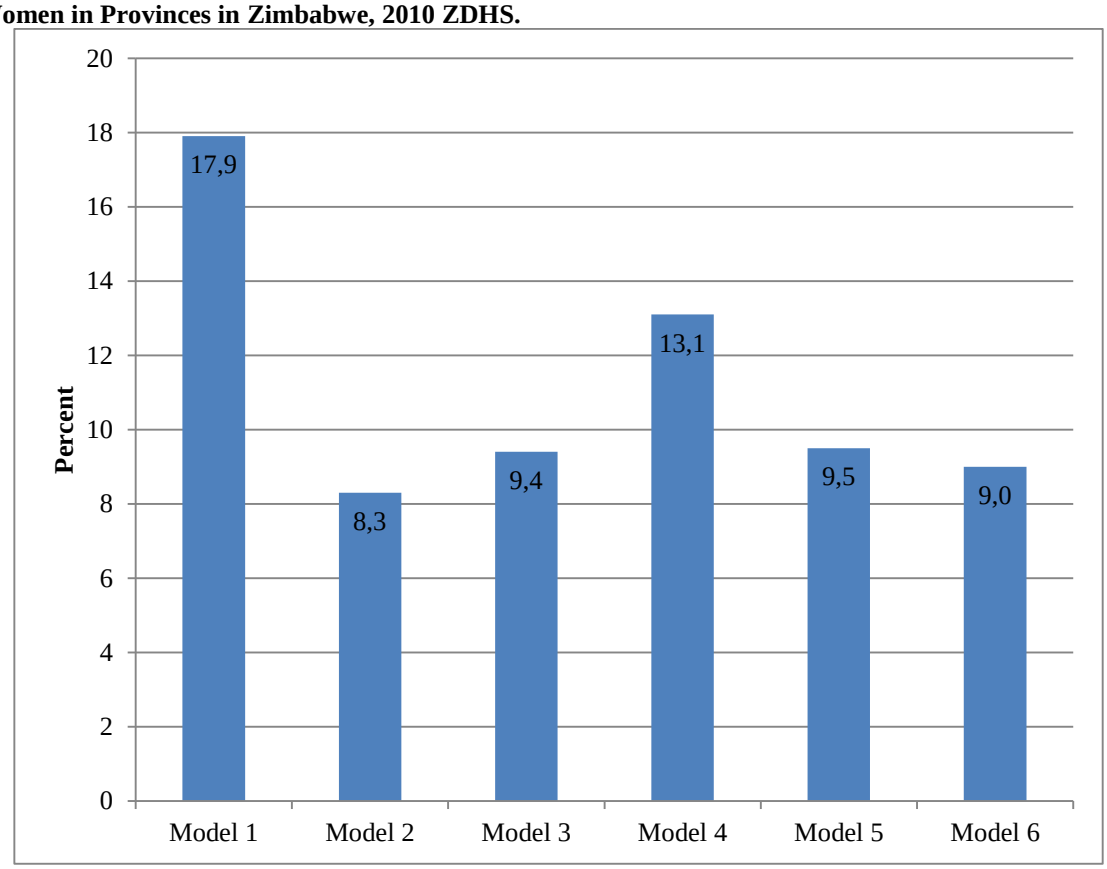


Table 17: Multilevel Odds Ratios Assessing Effects of Individual and Community Characteristics on Use of Modern Contraceptives by Adolescent Women, Zimbabwe (Models 1, 2 and 3)

Variables	Model 1 (EMPTY)		Model 2		Model 3	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Intercept	-0.996 (0.624)		-0.237 (0.129)		-1.690 (0.659)	
Random Intercept Variance	0.715 (0.302)		0.296 (0.078)***		0.328 (0.298)	
ICC (%)	17.9		8.3		9.4	
PCV (%)	-		58.6		47.5	
AIC	2543.224		2228.968		2020.400	
BIC	2547.842		2230.264		2024.525	
INDIVIDUAL LEVEL						
Age						
15 to 17 years			1			
18 to 19 years			-0.050	0.951		
Marital Status						
Never Married			1			
Ever Married			1.057 (0.252)	2.877***		
Parity						
None			1			
One or more			2.809 (0.284)	16.593***		
Age Difference with Spouse						
Large			1			
Small/None			-0.417	0.659		
Education						
None/ Primary			1			
Secondary/Higher			-0.206	0.814		
Religion						
Protestant/Pentecostal			1			
Traditional/Apostolic Sect			-0.654	0.520		
Catholic/Muslim/None/Others‡			-0.142	0.868		
Residence						
Urban			1			
Rural			-0.197	0.821		

Variables	Model 1 (EMPTY)		Model 2		Model 3	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Media Access						
No Access			1			
Average Access			0.651 (0.296)	1.918***		
High Access			0.794 (0.234)	2.212***		
Household Wealth Index						
Low					1	
Medium					0.340 (0.246)	1.363
High					0.190 (0.227)	1.209
Level of Autonomy						
Low Autonomy					1	
High Autonomy					0.477 (0.230)	1.611***
COMMUNITY LEVEL						
Provincial Quality of reproductive health care Index						
Low						
High						
Provincial Barriers to health care access						
Low						
High						
Socio-economic Development Index						
Low						
High						
Interaction (High Socio-economic Development and Media Access)						
No Access						
Average Access						
High Access						

*****=p<0.05; ł =Others includes other Christian religions not mentioned**

NI = Not Included

NA = Not Applicable

Table 18: Multilevel Odds Ratios Assessing Effects of Individual and Community Characteristics on Use of Modern Contraceptives by Adolescent Women, Zimbabwe (Models 4, 5 and 6)

Variables	Model 4		Model 5		Model 6	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Intercept	-1.396 (0.156)		-2.122 (0.657)		-2.673 (0.681)	
Random Intercept Variance	0.482 (0.566)		0.302 (0.846)		0.282 (0.628)	
ICC (%)	13.1		9.5		9.0	
PCV (%)	32.6		57.8		60.6	
AIC	2341.723		2259.629		2012.032	
BIC	2345.741		2263.655		2016.163	
INDIVIDUAL LEVEL						
Age						
15 to 17 years			1			
18 to 19 years			0.173 (0.292)	1.189		
Marital Status						
Never Married			1		1	
Ever Married			0.908 (0.244)	2.479***	0.935 (0.266)	2.547***
Parity						
None			1		1	
One or more			2.610 (0.272)	13.6***	2.619 (0.266)	13.722***
Age Difference with Spouse						
Large			1			
Small/None			-0.106 (0.280)	0.899		
Education						
None/ Primary			1			
Secondary/Higher			0.062 (0.292)	1.064		
Religion						
Protestant/Pentecostal			1			
Traditional/Apostolic Sect			-0.416 (0.306)	1.516		
Catholic/Muslim/None/Others‡			-0.023 (0.373)	0.977		
Residence						
Urban			1			
Rural			-0.041 (0.565)	0.960		
Media Access						

Variables	Model 4		Model 5		Model 6	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
No Access			1		1	
Average Access			0.598 (0.232)	1.818***	0.365 (0.268)	1.440
High Access			0.758 (0.328)	2.134***	0.561 (0.326)	1.752
Household Wealth Index						
Low			1			
Medium			-0.110 (0.345)	0.896		
High			-0.179 (0.406)	0.836		
Level of Autonomy						
Low Autonomy			1			
High Autonomy			-0.046 (0.259)	0.955		
COMMUNITY LEVEL						
Provincial Quality of reproductive health care Index						
Low	1		1			
High	0.141 (0.291)	1.151	0.177 (0.427)	1.194		
Provincial Barrier to health care access						
Low	1		1		1	
High	0.396 (0.130)	1.586***	0.698 (0.212)	2.010***	0.793 (0.233)	2.211***
Socio-economic Development Index						
Low	1		1			
High	-0.694 (0.323)	0.500***	-1.545 (0.620)	0.213***		
Interaction (High Socio-economic Development and Media Access)						
No Access					0.015 (0.730)	1.015
Average Access					-1.158 (0.471)	0.314***
High Access					-0.828 (0.518)	0.437

*****=p<0.05; ł =Others includes other Christian religions not mentioned**
NI = Not Included
NA = Not Applicable

7.2.2 Moderating effects of the macro-level variables on the association between individual/household variables and contraceptive use

To establish the moderating effects of macro-level variables on the association between significant micro-level variables and macro-level variables, interaction terms were introduced into the final model. Using the review of literature on individual characteristics that have been found to interact with community level characteristics to influence contraceptive use, a total of four cross level interactions were examined for their statistical significance so they could be included in the final model (model 6) and these are:

- Between provincial socio-economic development index and parity
- Between provincial socio-economic development and no access to media
- Between provincial socio-economic development and average access to media
- Between provincial socio-economic development and high access to media

Results from the final model (model 6) indicate that there was only one cross level interaction that was statistically significant. There was an interaction between access to media and high provincial socio-economic development. This means that the provincial socio-economic development acted as a modifier for the association between access to media and adolescent women modern contraceptive use. The cross level interaction between provincial socio-economic development and high media access model was as follows:

- $\beta_1 = \gamma_{10} + \gamma_{11}$ * (Provincial Socio-economic Development)

High provincial socio-economic development had a decreasing effect on the association between adolescent women with high media access whereas it increased the level of association between use of modern contraceptive and those with average access to media.

7.3 Health Facility Use for Delivery

7.3.1 Independent effects of macro level contextual variables on utilisation of health facility for delivery of last child

Results of the final multilevel logistic regression for use of health facility by adolescent women in Zimbabwe are shown in Tables 19 and 20. The table presents the coefficients estimated from the models.

Model 1, which is an empty model had a random intercept variance at the community-level was 0.758 and was significant. The ICC for model 1 was 18.7%. The random intercept variance for this model is used as a reference for random intercept values for subsequent models.

In model 2, micro-level variables were introduced. The model correctly predicted 74.3% of the cases. Women who gave birth to their last child aged 18 to 19 years were more likely to have delivered in a health facility that those that gave birth aged 15 to 17 years (Odds Ratio, 1.958). Those that had at least one previous birth at the time of delivery were less likely to have used a health facility to deliver their last child five years preceding the survey (Odds Ratio, 0.264) than those with no previous births. Women who were ever married were more likely to use the health facility for delivery (Odds Ratios: Married/Cohabiting; Widowed/Separated/Divorced, 1.624; 1.693 respectively). Women with secondary education or more were almost twice as likely to have delivered their last child at health facility as adolescents during the five years preceding the survey than their counterparts with primary education or less (Odds Ratio, 2.029).

Model 2 also indicates that women affiliated to Traditional and Apostolic Sect religions, as well as those affiliated to other religions or none (Catholic, Muslim, Other Christian religion and those not affiliated to any religion) were less likely to have reported use of health facility for delivery of their last child as adolescents as compared to those affiliated to either Protestant or Pentecostal religions (Odds Ratios, 0.591; 0.467 respectively). With regard to access to media, women with high media access were more than twice as likely to report delivering their last child as an adolescent in a health facility during the five years preceding the survey than those with no access to media (Odds Ratio, 2.452). Adding the individual-level variables helped to achieve a better model for use of health facility for delivery because it helped to

reduce the community (province) level variance from 0.682 to 0.495, a 34.7% proportional reduction in variance from the empty model. This shows that the individual variables do help to explain some of the variation in the use of health facility for delivery of last child by adolescents between provinces in Zimbabwe. The ICC was reduced to 13.1% indicating that the clustering of use of health facility for childbirth was related to the composition of adolescent women by their individual level characteristics.

Model 3 included household level variables only. The likelihood of utilising a health facility for delivery of last child as an adolescent during the five years preceding the survey increased with the level of household wealth. Those that were from medium and high wealth households were 1.8 and 2.3 times more likely to report having delivered their last child in a health facility as adolescents during the five years preceding the survey. The odds also increased with the level of autonomy as those with high autonomy were more than three times as likely to have used a health facility for delivery of their last child. Model 3 has a random intercept variance of 0.540 which is not significant. Compared to the empty model, the random intercept variance had a 28.8% reduction. However, this is slightly higher than that of model 2 with an ICC of 14.1.

Model 4 included the macro-level variables only. All the three main macro-level variables were positively and significantly associated with use of health facility for delivery. Results from this model indicated that residing in a province with a high quality of reproductive health care was positively associated with higher odds of women reporting health facility use for delivery of last child as adolescents (Odds Ratio, 2.555). The odds of a woman using a health facility for delivery of their last child as adolescent during the five years preceding the survey were higher for women residing in provinces with high barriers to health care access (Odds ratio, 2.257). This means that provinces that had a high proportion of women reporting at least one serious problem accessing health care were less likely to have adolescent women using a health facility for delivery of their last child. Furthermore, the likelihood of using a health facility for delivery by adolescent women was higher among women who resided in provinces that had a high socio-economic development (Odds ratio, 2.259). The variance of the random intercept for model 4 reduced to 0.346 from 0.450 indicating that macro level variables explained some of the variation much more than the micro level individual variables. The percentage reduction in the variance of the random intercept from the empty model is 42.5%

and the ICC was further reduced to 11.7% indicating that including provincial-level characteristics improved the fit.

Model 5 involved including both the micro-level variables as well as the macro level variables. The model showed that residence is not a significant individual-level predictors of use of health facility for delivery of last child by adolescent women. At individual and household-level, the association of age at birth, birth order, level of education, religion, level of media access, household wealth index, and level of autonomy to use of health facility for delivery remained statistically significant just as in model 3. Marital status was significantly related to use of health facility for delivery with married adolescent women being almost twice as likely to use the health and those widowed, divorced or separated being more than twice as likely to use the health facility for delivery. The odds of using a health facility for delivery of last child as adolescents were higher for women who gave birth between 18 and 19 years, the ever married (married, cohabiting, widowed, separated, divorced), those with secondary or higher, who have high media access and those that have high autonomy. The likelihood of using a health facility was also higher for women in the medium and high wealth indexes (Odds ratio, 1.8 and 2.4 respectively). However, using the health facility for delivery of last child as an adolescent was less likely for women who were affiliated to Traditional/Apostolic religions (Odds ratio, 0.584) and Catholics/Muslims/None/Others (Odds ratio, 0.460) than their Protestant/Pentecostal counterparts. Further, the odds of using the health facility for delivery was lower for women having the second or more birth order child (Odds ratio, 0.353).

The relationship between provincial-level variables and use of health facility for delivery of last child remained positively significant in this model. The odds of women using the health facility for delivery of last child as adolescent during the five years preceding the survey were higher for women who resided in provinces with high quality of reproductive health care (Odds Ratio, 2.596), high barriers to health care access (Odds Ratio, 2.319) and high socio-economic development (Odds Ratio, 2.399). The variance of the random intercept was reduced further from that of model 4 and the reduction is 58.8% from that of the Model 1 (empty model). This combination model does explain more of the cluster variation between in use of health facility for childbirth by adolescent women. The ICC was further reduced to 8.7% indicating that a combination of individual-level and provincial-level characteristics helped in obtaining a better fit.

The final model (model 6) included only the individual (micro) level variables and community (macro) level variables that were significantly associated with the outcome variable of interest (use of health facility for childbirth) in model 5. It is the final hierarchical model for explaining the use of health facility for delivery of last child by adolescents. It is in this model that interaction terms were introduced to assist in answering Objective 5 of this study. The relation between age at birth, birth order marital status, education, religion, media access, household wealth and autonomy to use of health facility for delivery as adolescents remained similar to that of the model 4. However, the odds of use of health facility for delivery increased for level of education mainly due to the interaction with provincial quality of reproductive health care. The random intercept variance for the model is 0.280 which was insignificant. This is a 76.3% proportional change in variance from the empty model (empty model). The ICC of 5.2% indicates a better explanatory model and explains that clustering of use of health facility for childbirth was related to individual-level and community-level variables. The independent effects of macro-level variables as indicated by the final model are mentioned below.

Independent effects of macro-level contextual variables on use of health facility for childbirth

The results from the final model (model 6) clearly indicate that two community-level variables had an independent effect on use of health facility for birth of last child for adolescent women in Zimbabwe. Provincial barriers to health care access, as well as provincial socio-economic development index were significant predictors of use of health facility for birth of last child by adolescent women. Women who resided in a province with high barriers to health care access were more likely to have delivered their last child in a health facility. Adjusted for all other individual-level and community-level variables, the odds of delivering a child in a health facility by adolescent women were positively associated with high provincial barriers to health care access (Odds Ratio, 2.323). Residing in a province with a high socio-economic development increased the odds of women delivering their last child in a health facility as an adolescent (Odds Ratio, 2.406).

Table 19: Multilevel Odds Ratios Assessing Effects of Individual and Community Characteristics on Utilisation of Health Facility for Childbirth by Adolescent Women, Zimbabwe (Model 1, 2 and 3)

Variables	Model 1 (EMPTY)		Model 2		Model 3	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Intercept	0.770 (0.206)***		0.112 (0.222)		-0.323 (0.232)	
Random Intercept Variance	0.758 (0.200)***		0.495 (0.233)		0.540 (0.254)	
PCV (%)	-		34.7		28.8	
ICC (%)	18.7		13.1		14.1	
AIC	3569.056		3431.056		3401.654	
BIC	3570.032		3432.578		3403.194	
INDIVIDUAL LEVEL						
Age at Birth						
Less than 18 years			1			
18 to 19 years			0.672 (0.206)	1.958***		
Birth Order						
First Birth			1			
Second or More Births			-1.331 (0.265)	0.264***		
Marital Status						
Single			1			
Married/Cohabiting			0.485 (0.210)	1.624***		
Widowed/Separate/Divorced			0.527 (0.204)	1.693***		
Level of Education						
None/ Primary (RC)			1			
Secondary or Higher			0.708 (0.196)	2.029***		
Religion						
Protestant/Pentecostal			1			
Traditional/Apostolic Sect			-0.516 (0.235)	0.597***		
Catholic/Muslim/None/Others‡			-0.808 (0.260)	0.446***		
Residence						
Urban			1			
Rural			-0.322 (0.372)	0.725		

Variables	Model 1 (EMPTY)		Model 2		Model 3	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Media Access						
No Access			1			
Average Access			0.200 (0.213)	1.221		
High Access			1.078 (0.323)	2.939***		
Household Wealth Index						
Low					1	
Medium					0.575 (0.238)	1.777***
High					0.942 (0.300)	2.345***
Level of Autonomy						
Low Autonomy					1	
High Autonomy					1.134 (0.192)	3.107***
COMMUNITY (Provincial) LEVEL						
Provincial Quality of reproductive health care Index						
Low						
High						
Provincial Barriers to health care access						
Low						
High						
Socio-economic Development Index						
Low						
High						
Interaction between Quality of reproductive health care and Level of Education						

*****=p<0.05; ł =Others includes other Christian religions not mentioned**
NI = Not Included
NA = Not Applicable

Table 20: Multilevel Odds Ratios Assessing Effects of Individual and Community Characteristics on Utilisation of Health Facility for Childbirth by Adolescent Women, Zimbabwe (Model 4, 5 and 6).

Variables	Model 4		Model 5		Model 6	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Intercept	-1.459*** (0.186)		-1.879*** (0.410)		-1.904*** (0.438)	
Random Intercept Variance	0.346 (0.210)		0.312 (0.261)		0.180 (0.230)	
PCV (%)	42.5		58.8		76.3	
ICC (%)	11.7		8.7		5.2	
AIC	3301.966		3058.813		3049.519	
BIC	3306.491		3063.413		3054.063	
INDIVIDUAL LEVEL						
Age at Birth						
Less than 18 years			1		1	
18 to 19 years			0.460 (0.207)	1.584***	0.458 (207)	1.580***
Birth Order						
First Birth			1		1	
Second or More Births			-1.041 (0.266)	0.353***	-0.986 (0.265)	0.373***
Marital Status						
Single			1			
Married/Cohabiting			0.639 (0.317)	1.894***	0.628 (0.312)	1.873***
Widowed/Separate/Divorced			0.861 (0.412)	2.365***	0.858 (0.404)	2.358***
Level of Education						
None/ Primary (RC)			1		1	
Secondary or Higher			0.645 (0.197)	1.905***	1.082 (0.197)	2.950***
Religion						
Protestant/Pentecostal			1		1	
Traditional/Apostolic Sect			-0.538 (0.236)	0.584***	-0.478 (0.234)	0.620***
Catholic/Muslim/None/Others‡			-0.776 (0.262)	0.460***	-0.791 (0.262)	0.453***
Residence						
Urban			1			
Rural			-0.428 (0.410)	0.652		

Variables	Model 4		Model 5		Model 6	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Media Access						
No Access			1		1	
Average Access			0.025 (0.215)	1.026	0.053 (0.215)	1.054
High Access			0.889 (0.324)	2.432***	0.940 (0.324)	2.560***
Household Wealth Index						
Low			1		1	
Medium			0.587 (0.239)	1.798***	0.612 (0.239)	1.844***
High			0.893 (0.303)	2.394***	0.972 (0.271)	2.644***
Level of Autonomy						
Low Autonomy			1		1	
High Autonomy			1.078 (0.193)	2.937***	1.078 (0.189)	2.939***
COMMUNITY (Provincial) LEVEL						
Provincial Quality of reproductive health care Index						
Low	1		1			
High	0.938 (0.403)	2.555***	0.954 (0.392)	2.596***		
Provincial Barriers to health care access						
Low	1		1		1	
High	0.814 (0.402)	2.257***	0.841 (0.413)	2.319**	0.843 (0.410)	2.323***
Socio-economic Development Index						
Low	1		1		1	
High	0.815 (0.398)	2.259***	0.875 (0.427)	2.399***	0.878 (0.408)	2.406***
Interaction between Quality of reproductive health care and Level of Education					1.086 (0.392)	2.962***

*****=p<0.05; ł =Others includes other Christian religions not mentioned**
NI = Not Included
NA = Not Applicable

Figure 9: Proportional Change in Variance for Use of Health Facility for Delivery of Last Child by Adolescent Women in Zimbabwe by Model using Model 1 (Empty Model) as a Reference, 2010 ZDHS.

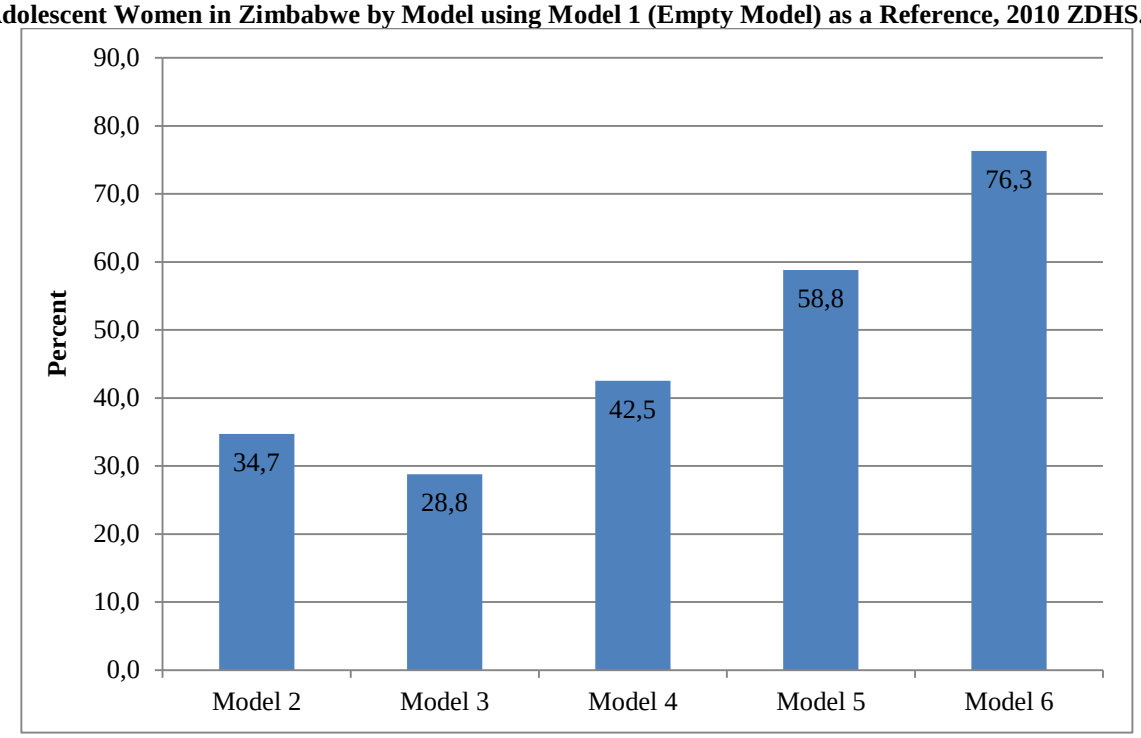
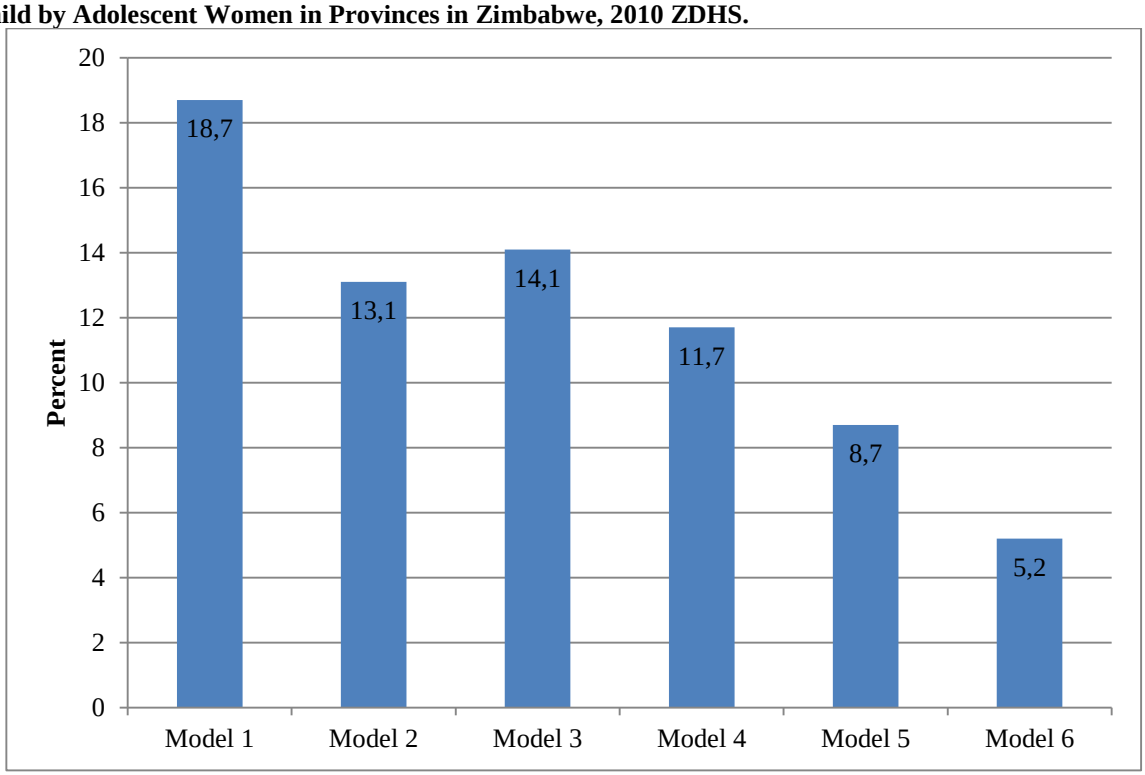


Figure 9 shows the proportional change in the random variance by model using the empty model as a reference. There is an increase in the PCV showing an improvement as adjustments are made to the models. The first model which included micro-level variables only explained 40% of the variance whereas macro-level variables alone explained 42.5% of the variance. A combination of the both individual and provincial-level variables improved the model. When non-significant variables were removed to make an adjustment, there was a 76.3% reduction in the random intercept variance from the empty model. Figure 10 on the other hand shows a reduction in the ICC from the first model to model 5 indicating that the inclusion of variables improved the models with each successive model.

Figure 10: Intra-Class Correlation (ICC) Coefficient for Use of Health Facility for Delivery of Last Child by Adolescent Women in Provinces in Zimbabwe, 2010 ZDHS.



7.3.2 Moderating effects of the macro-level variables on the association between micro-level variables and utilisation of health facility for childbirth

Interaction terms were introduced in the models to check for moderating effect of community-level variables on the association between some individual-level variables and macro-level variables. This was done through the following twelve cross level interactions as informed by the review of literature on individual characteristics that have been found to interact with community level characteristics to influence utilization of health facility for childbirth;

- For provincial quality of reproductive health care index, the following micro-level variables were tested: birth order, level of media access, household wealth and level of autonomy
- For provincial socio-economic development index, the following variables were tested: age at birth, level of education, religion, household wealth and level of autonomy

- For provincial barriers to health care access, the following micro-level variables were tested for interaction: age at birth, birth order, marital status, level of education, household wealth and level of autonomy

In the final model (model 6) as shown in Table 20, there was only one significant cross level interaction. There was an interaction between level of education and the provincial quality of health care index. Therefore, the provincial quality of reproductive health care acted as a moderator for the association between education level and use of health facility for childbirth for adolescent women. The association between education and use of health facility for childbirth by adolescents changed as a function of the quality of reproductive health care in a province of Zimbabwe.

The cross level interaction between provincial quality of reproductive health care and level of education model was as follows:

- $\beta_5 = \gamma_{50} + \gamma_{51}$ * (Provincial Quality of Reproductive Health Care)

The interaction effect has a coefficient of 1.086 indicates positive impact of education on use of health facility for delivery. Thus, the effect of level of education on use of health facility for delivery of last child by adolescent women is increased for women residing in provinces that have a high quality of reproductive health care.

7.4 PNC Service Use

7.4.1 Independent effects of macro-level variables on PNC service use by adolescent women

Tables 21 and 22 display the results of the final multilevel logistic regression using the Generalised Linear Mixed Model (GLMM) for utilisation of PNC services by women who gave birth to their last child as adolescents during the five years preceding the survey. Model 1 was an empty model, that is, it was run without any micro-level variables, as well as the macro-level variables of interest. It examined the intercept of the model, as well as the random variance component of the intercept. The empty model had a random intercept variance of

0.938 which was significant. The ICC for the empty model was 22.2%. Since there were no variables included in the model, the cluster variation could be either due to unobserved micro level variables or could be due to some other unobserved macro level variables.

The next stage was to control for micro-level variables (Model 2). All micro-level variables which had a significant relationship at bivariate level were put into the model and other individual-level variables which are deemed to be biologically related to PNC service use were added in stages to get a better fit. Only two variables were statistically significant in this model. Adolescent women having at least a second birth were less likely to utilise PNC services as compared to those with their first birth (Odds ratio, 0.551). Those who had high access to media were more likely to have used PNC services after delivery of their last child than those with no access to media (Odds ratio, 2.821). There was no statistically significant difference observed between those with medium access and those with no access. This model has a reduced random intercept variance of 0.492 which is not significant. The random intercept variance has been reduced by 47.5% from that of the empty model and the ICC was reduced to 13.0%. This shows that some of the between province variation in PNC utilisation may be attributable to micro-level variables but there still remains unexplained variation in the use of PNC services by adolescent women between provinces (communities).

Model 3 included adolescent women's level of autonomy and household wealth. Women with high autonomy were about twice as likely to have used the PNC services after delivery of their last child as women with low autonomy (Odds ratio, 1.960) but household wealth was not statistically associated with use of PNC services. The random intercept variance was further reduced to 0.439 which is a 53.2% proportional change in variance from model 1. The ICC was estimated at 11.8%.

Model 4 involved an introduction of macro-level variables only. After adjustment of macro-level variables, only two variables had an association with use of PNC services by adolescent women. Residing in a community (province) with high barriers to health care access was associated with higher odds of PNC service use by adolescent women after delivery of their last child (Odds Ratio, 1.656). The odds of utilising PNC services by women who delivered their last child as adolescents during the five years prior to the survey increased with residing in a province (community) with a high socio-economic development index (Odds ratio, 2.415). The random intercept variance of model 4 was reduced further to 0.386 and is not significant. This is reduction of 58.8% from the empty model and shows that macro

level contextual variables explain some of the differences in the level of PNC service use by adolescent women between provinces. The ICC was reduced to 10.5 indicating that inclusion of macro level contextual variables achieved a better explanatory model.

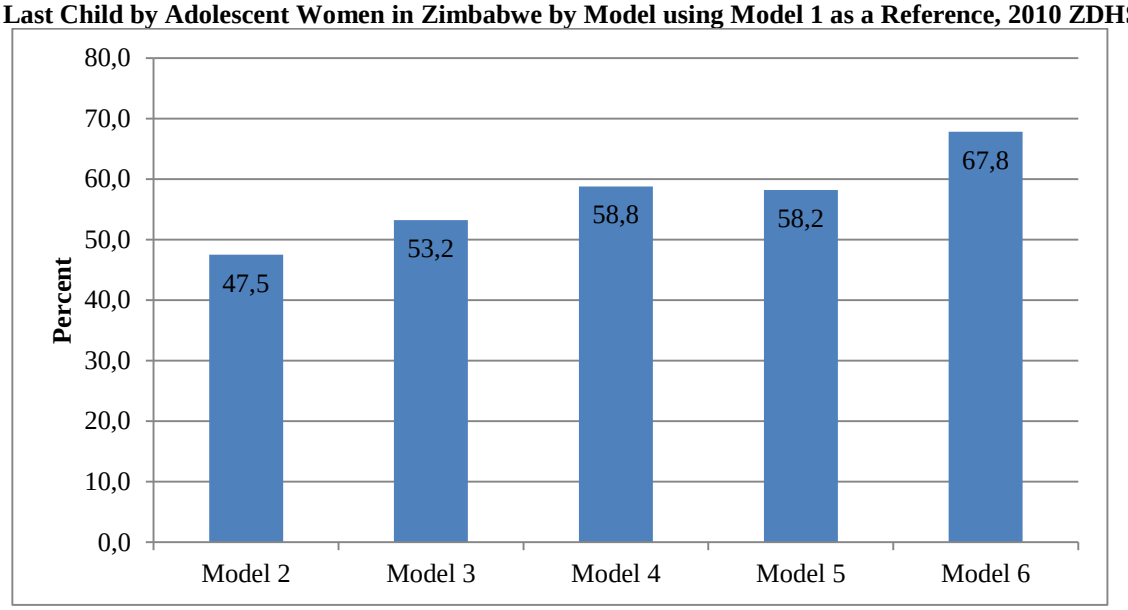
In model 5, the effect of both the micro-level and macro-level variables were evaluated. In a given province (community), women with high media access had higher odds of using PNC services than women with no access to media (Odds ratio, 2.467). The odds of using PNC service among women with high autonomy were almost twice as high as for women with low autonomy. The association between use of PNC services by adolescent women after delivery of their last child and macro-level variables were also similar to that in model 4. Residing in a province (community) with high barriers to health care access increased the odds of women utilising PNC services after delivery of last child as adolescent (Odds ratio, 1.476). The odds of utilising PNC services were slightly lessened on this model when compared to that of model 4. The likelihood of utilising PNC services by adolescent women increased with an increase in provincial socio-economic development (Odds ratio, 2.385).

Model 5 had a random intercept variance to 0.392 which is also not significant. The combination of micro-level variables and macro-level variables had a 58.2% reduction variance from the random intercept variance for model 1 (empty model). The ICC was 10.6, a slight increase from that of model 4. This is indication that the combination of these variables explains some of the between province differences in use of PNC services by adolescent women. Some of the variation however still remains unexplained and attributable to some of the unobserved macro level contextual variables.

In the final model (model 6), only micro-level variables and macro-level variables that had a significant association on use of PNC services in model 5 were evaluated for their effect on utilisation of PNC services by adolescent women. An interaction term was also introduced into this final hierarchical model and it is also used to answer objective 4 and 5. Only one individual level variable was associated with higher odds of use of PNC services by adolescent women. The association between PNC service utilisation by adolescent women and level of media access was diminished due to an interaction between provincial barriers to health care access and level of media access. Use of PNC services by adolescent women increased with increase in the level of autonomy. Adolescent women with high autonomy were almost twice as likely to be PNC service users as those with low autonomy (Odds ratio, 1.967). The variance of the random intercept, which was not significant, was further reduced from 0.392 in model

5 to 0.202. The percentage reduction from the random intercept variance for model 1 (empty model) to final model is 67.8%. The ICC was reduced to 5.8% indicating that the model had a better fit. The model reveals that only one macro level contextual variable with an independent effect on PNC service utilisation by adolescent women and is discussed later.

Figure 11: Proportional Change in Variance for PNC Service Utilisation within 48 hours after Delivery of Last Child by Adolescent Women in Zimbabwe by Model using Model 1 as a Reference, 2010 ZDHS.



Independent effects of macro level contextual variables on use of PNC services

Provincial quality of reproductive health care and provincial barriers to health care access did not have an independent effect on postnatal care utilisation within 48 hours after delivery of last child by adolescent women. Provincial quality of reproductive health care index was not associated with PNC utilisation whereas provincial barriers to health care access operated through level of media by adolescent women. Only provincial socio-economic development index had an independent effect on postnatal care utilisation within 48 hours after delivery of last child by adolescent women. Women who gave their last child as adolescents who resided in a province with a high socio-economic development had higher odds of utilising PNC services within 48 hours after delivery of their last child (Odds ratio, 2.505).

Figure 12: Intra-Class Correlation (ICC) Coefficient for Utilisation of PNC Services within 48 Hours of Delivery of Last Child by Adolescent Women in Provinces in Zimbabwe, 2010 ZDHS.

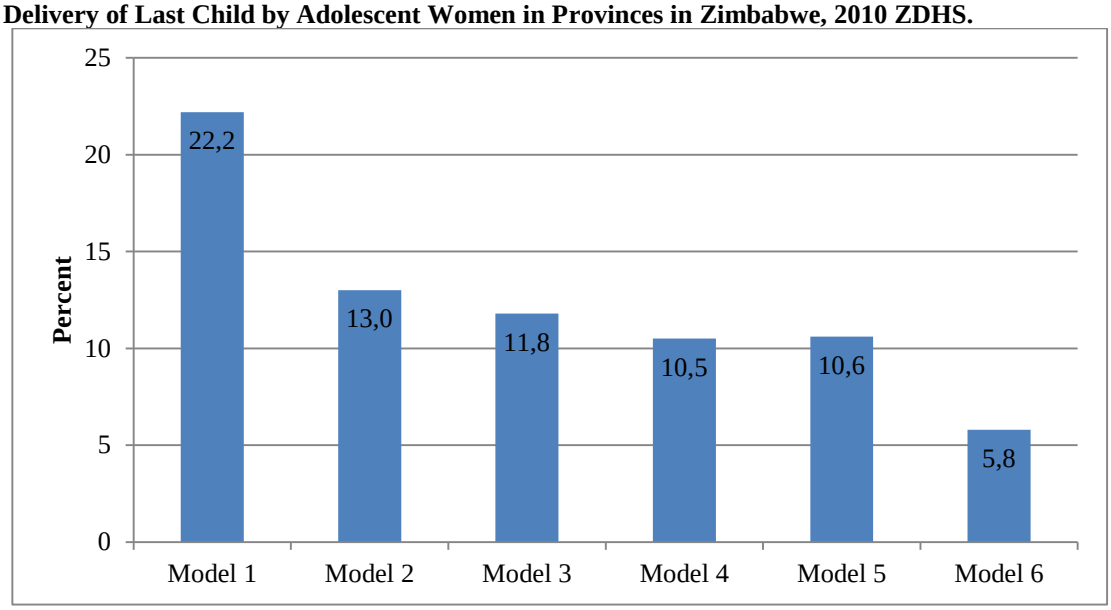


Figure 11 shows the proportional change in variance by model using the empty model (model 1) as reference. There is a significant reduction in the percentage of the random variance explained by each successive model. Model 4 included macro-level variables only. The difference in the proportional change in variance between model 4 and model 5 is not significant and this is also evident in figure 15 where the ICC values are almost similar between model 4 and model 5. Both the proportional change in variance and the ICC demonstrate that inclusion of macro-level variables had an effect on the likelihood of utilising postnatal care services within 48 hours after delivery of last child by adolescent women (see figure 12).

However, some variation still exists between provinces that can be explained better by other unobserved macro-level (community) variables that are associated with use of PNC services by adolescent women.

Table 21: Multilevel Odds Ratios Assessing Effects of Individual and Community Characteristics on Utilisation of PNC among Adolescent Women, Zimbabwe (Model 1, 2 and 3).

Variables	Model 1		Model 2		Model 3	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Intercept	-1.564 (0.479)***		-1.200 (0.164)		-2.036 (0.161)	
Random Intercept Variance	0.938 (0.334)***		0.492 (0.336)		0.439 (0.322)	
PCV (%)	-		47.5		53.2	
ICC (%)	22.2		13.0		11.8	
AIC	3571.074		3494.645		3374.956	
BIC	3572.396		3496.054		3375.638	
INDIVIDUAL LEVEL						
Age at Birth						
Less than 18 years			1			
18 to 19 years			0.3111 (0.217)	1.365		
Birth Order						
First Birth			1			
Second or More Births			-0.596 (0.295)	0.551*		
Marital Status						
Single			1			
Married/Cohabiting			-0.104 (0.283)	0.901		
Widowed/Separate/Divorced			-0.482 (0.393)	0.618		
Level of Education						
None/ Primary (RC)			1			
Secondary or Higher			0.293 (0.223)	1.340		
Religion						
Protestant/Pentecostal			1			
Traditional/Apostolic Sect			-0.378 (0.228)	0.685		
Catholic/Muslim/None/Others‡			-0.477 (0.243)	0.620		
Residence						
Urban			1			
Rural			-0.319 (0.296)	1.375		

Variables	Model 1		Model 2		Model 3	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Media Access						
No Access			1			
Average Access			0.222 (0.240)	1.128		
High Access			1.037 (0.303)	2.821***		
Household Wealth Index						
Low					1	
Medium					-0.272 (0.266)	0.761
High					-0.051 (0.292)	0.950
Level of Autonomy						
Low Autonomy					1	
High Autonomy					0.673 (0.205)	1.960***
COMMUNITY (Provincial) LEVEL						
Provincial Quality of reproductive health care Index						
Low						
High						
Provincial Barriers to health care access						
Low						
High						
Socio-economic Development Index						
Low						
High						
Interaction between Provincial Barriers to health care access and High Media Access						

*****=p<0.05; ł =Others includes other Christian religions not mentioned**

NI = Not Included

NA = Not Applicable

Table 22: Multilevel Odds Ratios Assessing Effects of Individual and Community Characteristics on Utilisation of PNC among Adolescent Women, Zimbabwe (Model 4, 5 and 6).

Variables	Model 4		Model 5		Model 6	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Intercept	-1.452 (0.517)***		-2.319 (0.583)***		-2.091 (0.535)***	NA
Random Intercept Variance	0.386 (0.281)		0.392 (0.231)		0.302 (0.135)	NA
PCV (%)	58.8		58.2		67.8	
ICC (%)	10.5		10.6		5.8	
AIC	3219.445		3120.818		3072.591	
BIC	3223.985		3125.339		3077.128	
INDIVIDUAL LEVEL						
Age at Birth						
Less than 18 years			1			
18 to 19 years			0.342 (0.218)	1.408		
Birth Order						
First Birth			1			
Second or More Births			-400 (0.296)	0.671		
Marital Status						
Single			1			
Married/Cohabiting			-0.246 (0.291)	0.782		
Widowed/Separate/Divorced			-0.574 (0.399)	0.563		
Level of Education						
None/ Primary (RC)			1			
Secondary or Higher			0.214 (0.223)	1.238		
Religion						
Protestant/Pentecostal			1			
Traditional/Apostolic Sect			-0.342 (0.228)	0.710		
Catholic/Muslim/None/Others‡			-0.305 (0.246)	0.737		
Residence						
Urban			1			
Rural			0.506 (0.346)	1.659		

Variables	Model 4		Model 5		Model 6	
	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio	Coefficients β (SE)	Odds Ratio
Media Access						
No Access			1		1	
Average Access			0.111 (0.242)	1.117	0.080 (0.225)	1.084
High Access			0.903 (0.304)	2.467**	0.510 (0.306)	1.665
Household Wealth Index						
Low			1			
Medium			-0.263 (0.266)	0.769		
High			-0.097 (0.290)	0.907		
Level of Autonomy						
Low Autonomy			1		1	
High Autonomy			0.671 (0.205)	1.956***	0.676 (0.198)	1.967***
COMMUNITY (PSU) LEVEL						
Provincial Quality of reproductive health care Index						
Low	1		1			
High	-0.156 (0.307)	0.855	0.671 (0.205)	0.826		
Provincial Barriers to health care access						
Low	1		1			
High	0.505 (0.220)	1.656*	0.490 (0.242)	1.476*		
Socio-economic Development Index						
Low	1		1		1	
High	0.882 (0.347)	2.415*	0.869 (0.366)	2.385*	0.918 (0.352)	2.505*
Interaction between Provincial Barriers to health care access and High Media Access					0.512 (0.227)	1.660**

*****=p<0.05; ł =Others includes other Christian religions not mentioned**

NI = Not Included

NA = Not Applicable

7.4.2 Moderating effects of the macro-level variables on the association between micro-level variables and utilisation of PNC services

To establish the moderating effects of macro-level variables on the association between micro-level variables, interaction terms were introduced into the final model. The effects were checked through the following four level interactions as informed by the review of literature on individual characteristics that have been found to interact with community level characteristics to influence utilization of PNC services;

- Between provincial barriers to health care access and level of media access
- Between provincial barriers to health care access and level of autonomy
- Between provincial socio-economic development and level of autonomy
- Between provincial socio-economic development and level of media access.

As indicated in the final model (model 6) in Table 23, there was only one significant cross level interaction. There was an interaction between media access and the provincial barriers to health care access. This means that the level of barriers to health care access at province level acted as a moderator for the association between level of media access and use of PNC services within 48 hours after delivery of last child by adolescent women.

The cross level interaction between provincial barriers to health care access and high media access model was as follows:

- $\beta_{10} = \gamma_{100} + \gamma_{101}$ * (Provincial Barriers to health care access)

The cross level interaction of access to media and the proportion of women with at least secondary education had a coefficient of 0.512 meant that the positive impact of accessing media was mitigated by an increase in the level of barriers to health care access in a province (community).

CHAPTER 8: OVERALL CONTRIBUTION OF MACRO LEVEL CONTEXTUAL VARIABLES EFFECTS TO REPRODUCTIVE HEALTH CARE UTILISATION BY ADOLESCENT WOMEN IN ZIMBABWE

8.1 Introduction

This chapter addresses the fifth objective of this study and seeks to compare the overall contribution of macro-level variable effects to reproductive health care utilisation with the contribution by micro-level variable effects. To accomplish this objective, the random intercept variance (RIV) coefficient obtained from the multilevel modelling analysis in chapter 6 was used to test for either heterogeneity or homogeneity across provinces of Zimbabwe. Using the RIV, the ICC which also corresponds to the VPC can be computed. The ICC gives the degree of resemblance between individuals within the province and was calculated using the following formula:

- $ICC = \sigma^2_u /(\sigma^2_u + (\pi^2/3))$

Comparison of the contribution of macro-level variable effects to modern contraceptive use with that of micro-level variable effects require the use of the predicted probability of use of modern contraceptives by adolescent women. The predicted probability of using modern contraceptives by adolescent women was calculated by working out the antilog function of Xβ: $\mathbf{p=[1 + exp(-X\beta)^{-1}]}$. Variables that were included in the final model (model 6) were identified. Macro-level variables that operated through micro-level variables were not considered here. The contribution for each variable was produced by entering varying values for each variable into the model equations and observing the predicted probability of utilising reproductive health services by adolescent women.

8.2 Use of Modern Contraceptives

From the final model (model 6), only one macro-level variables had a significant independent effect on adolescent women's use of modern contraceptives. Provincial barriers

to health care access had an independent effect on adolescent women's use of modern contraceptives whereas provincial socio-economic development influenced use through micro-level variables. The interaction between the provincial socio-economic development and access to media meant that its contribution on adolescent use of modern contraceptive would depend on the proportion of adolescents with high access to media. The predicted probability of using modern contraceptive in the exposed group and in the unexposed group by adolescent women is presented in Table 23. Parity is the only micro-level variable that was associated with adolescent use of contraceptives in the final model (model 6) in Table 18. Since parity was a discrete variable, the unexposed group would be the parity for the individual adolescent at the 10^{th} percentile and the exposed would be parity for the individual adolescent at the 90^{th} percentile. From the observed data, parity for the 10^{th} percentile was 0 and for the 90^{th} percentile, parity was 1. The contribution of parity would have 0 value for the unexposed and 1 for the exposed.

For provincial variables, the contribution of provincial barriers to health care access on use of modern contraceptives by adolescent women is estimated by getting the difference between the predicted probabilities of using modern contraceptives among the exposed group and the predicted probability of using modern contraceptives among the unexposed group. The exposed group was the individual in a province with high barriers to health care access and the unexposed group was the individual in a province with low barriers to health care access respectively. When controlling for all other variables under the final multilevel model for use of modern contraceptives by adolescent women, the contribution of specific variables are as follows:

- The change in parity from no child to one or more children ever born resulted in an increase of 45.9% in the probability of using modern contraceptives by adolescent women.
- The change in the level of media access from no access to average access resulted in an increase in the probability of using contraceptive by 8.3% whereas from no media access to high media access resulted in an increase of 13.0% in the probability of using contraceptive methods by adolescent women.
- The change in the level of provincial barriers to health care access by women from low access to high access resulted in an increase of 10.0% in the probability of using modern contraceptives by adolescent women.

Results in Table 23 show that the predicted probability of using a modern contraceptive due to a change in the macro-level factors is less significant than that due to the individual-level factor. Findings indicate that parity had the highest effect in influencing use of modern contraceptive by adolescent women. Thus, the contribution of macro-level variable effect to contraceptive use by adolescent women is less than the contribution by micro-level variable effects.

Table 23: Estimation Predicted Probability that an Adolescent Woman would Use Modern Contraceptives, a Health Facility for Childbirth and PNC Services in Exposed and Non-exposed Groups and Overall Contribution.

Variables		Coefficient (β)	Predicted Probability of using modern contraceptives		Overall Contribution
			Non-Exposed	Exposed	
USE OF MODERN CONTRACEPTION					
Individual Level (Reference)					
Parity (None)	One or More	2.486	9.3%	55.2%	**45.9%**
Level of Media Access (Low)	Average	0.365	31.1%	39.4%	**8.3%**
	High	0.561	30.9%	43.9%	**13.0%**
Community Level (Reference)					
Provincial Barriers to health care access (Low)	High	0.793	35.4%	45.3%	**10.0%**
USE OF HEALTH FACILITY FOR CHILDBIRTH					
Individual Level (Reference)					
Age at Birth (Less than 18 years)	18 to 19 years	0.458	64.9%	74.5	**9.6**
Birth order (First Birth)	Second birth or more	-0.986	74.4	52.0	**-22.4**
Marital Status (Never Married)	Married	0.628	59.4	73.3	**13.9**
	Widowed/ Separated/ Divorced	0.858	62.2	79.5	**17.3**
Education (Primary/None)	Secondary or more	1.082	55.6	78.7	**23.1**
Religion (Protestant/Pentecostal)	Traditional/ Apostolic Sect	-0.478	77.1	67.6	**-9.5**
	Catholic/ Others	-0.791	78.4	62.2	**-16.2**
Media Access (No Access)	Average	0.053	71.0	72.1	**1.1**
	High	0.940	63.8	81.8	**18.1**
Household Wealth Index (Low)	Medium	0.612	67.3	79.2	**11.8**
	High	0.972	62.4	81.4	**19.0**
Autonomy (Low)	High	1.078	57.4	79.9	**22.4**
Community Level (Reference)					

Variables			Coefficient (β)	Predicted Probability of using modern contraceptives		Overall Contribution
				Non-Exposed	Exposed	
Provincial Barriers to health care access (Low)	High		0.843	55.5	87.7	**32.3**
Provincial Socio-economic Development (Low)	High		0.878	58.4	89.7	**31.3**
USE OF POSTNATAL CARE						
Individual Level (Reference)						
Media Access	Average	0.08	18.2		19.1	**1.2**
	High	0.510	16.0		24.1	**8.1**
Level of Autonomy		0.676	13.6		23.6	**10.0**
Community Level (Reference)						
Provincial Socio-economic Development Index	0.918	18.9	36.8		**17.9**	

8.3 Use of Health Facility for Childbirth

From the analytical results of Objective 3 and 4, a total of two macro-level variables had a significant independent effect on women's use of health facility for birth of last child as adolescent women during five years preceding the survey. The final model (model 6) also indicates that there is an interaction between provincial (community) quality of reproductive health care and education level of individuals.

Table 23 presents the predicted probabilities estimated from coefficients in the final model (model 6) derived in Table 20. The contribution is the difference between the predicted probability of using a health facility for child birth if belonging to an exposed group and the predicted probability of using a health facility for childbirth if belonging to an unexposed group. For micro-level variables, the exposed group would be a group with a specific characteristic of interest in the study. For example, if the characteristic of interest is level of education, and education is categorised into two (No education/Primary, secondary education or more), then being exposed would be the group with secondary education or more.

For macro-level variables, the exposed group would be the category labelled high for provincial (community) quality of reproductive health care index, provincial barriers to health care access and provincial socio-economic development respectively. Results shown in Table 23 indicate a considerably high level of differences between the contribution of micro-level variable effects on use of health facility for childbirth by adolescent women, and the contribution of macro-level variable effects. The following are specific contributions for each of the variables for use of health facility for child birth by adolescents when all other variables are controlled for under the final multilevel model (model 6):

- The change in the age at birth from giving birth at less than 18 to giving birth between ages of 18 and 19 years resulted in an increase of 9.61% in the probability of using a health facility for childbirth by adolescent women.
- A change in the birth order from first child to second or more children by adolescent women would decrease the probability of using a health care facility for childbirth by 22.4%.
- A change in the marital status from being never married to being married by adolescent women would increase the probability of using a health care facility for delivery of child by 13.9% and a change to widowed/separated/divorced status would increase use of health facility for delivery of child by 17.3%.

- A change in the level of education from having primary or no education to having secondary and above resulted in an increase of 23.16% in the probability of using a health facility for childbirth.
- The change of religion affiliation from Protestant/Pentecostal to either Traditional or Apostolic Sect religion resulted in a decrease of 9.5% in the probability of use of health facility for childbirth by adolescent women. The probability would be decreased by 16.2% by a change in the religious affiliation from Protestant/Pentecostal to Catholic/Others.
- A change in the media access status from no access to high media access resulted in an increase of 18.1% in the probability of use of health facility for childbirth by adolescent women.
- A change in the household wealth status from low to medium resulted in an increase of 11.8%% in the probability of use of health facility for child birth whereas it resulted in an increase of 19% if the change was from low to high household wealth status.
- A change in the level of autonomy from low autonomy to high autonomy resulted in an increase of 22.4% in the probability of using a health facility for childbirth by adolescent women.
- A change in the provincial barriers to health care access from the low to high resulted in an increase of 32.3% in the probability of use of health facility for childbirth by adolescent women.
- The change in the provincial socio-economic development index from low to high resulted in an increase of 31.3% in the probability of using a health facility for child birth.

Clearly, from the results presented, it is evident that the change in the predicted probability of using a health care facility by adolescent women due to the change in macro-level variables status was generally more significant than those of the micro-level variables. The change of the predicted probability ranged between 1.1% and 23.1% in absolute value terms among micro-level variables, whereas the probability value for macro-level variables hovered above 30%.

8.4 Use of PNC Services

Results from the final model (model 6) in Table 22 clearly show that there were 2 macro level contextual variables that had a significant effect on use of PNC services by adolescent women. Only one of the variables had a direct effect on PNC service use whereas one had an indirect effect due to its interaction with media access and that is the provincial socio-economic development. The interaction between the provincial barriers to health care access with level of media access means that the contribution of the contextual effect of the provincial barriers to health care access would also depend on the proportion of women with high level of access to media.

The contribution of both significant micro-level and macro-level variables is estimated with use of predicted probabilities derived from coefficients from the final model (model 6) presented in Table 22. Table 23 presents the predicted probabilities of using PNC services by adolescent women in exposed and unexposed groups. The formula for estimating predicted probabilities is presented in section 4.6 (Meeting Objective 5). The contribution of each variable would be the difference between the predicted probability of using PNC services by adolescent women after delivery of their last child in an exposed group and the predicted probability in an unexposed group. For micro-level variables, the exposed group would be the group experiencing a specific characteristic. For level of media and level of autonomy, the exposed group was women with high access, and high autonomy respectively. For macro level contextual variables, exposed group was the provinces with high socio-economic c development and would therefore take the value 1, and the unexposed would take the value 0.

Results in Table 23 indicate that there is a difference between the contribution of individual level variables and that of macro-level variables on the on the use of PNC services by adolescent women after delivery of their last child. Specifically, the following would be specific contributions for each variable when all other variables are controlled for in the final model (model 6);

- The change in the level of media access from no access to high access resulted in an increase of 8.1% in the probability of use of PNC services within 48 hours of delivery of last child by adolescent women. The change to average media access resulted in 1.2% increase.

- The change level of autonomy from low autonomy to high autonomy resulted in an increase of 10.0% in the probability of using PNC services within 48hours of delivery of last child by adolescent women.
- The change in the provincial level of socio-economic development from low to high resulted in an increase of 17.9% in the probability of utilising PNC service within 48 hours after delivery of last child by adolescent women.

These estimations indicate that the change in the predicted probability of using PNC services due to the change in the macro-level variables was more significant than the change in predicted probability due to a change in micro-level variables. Therefore, both micro-level and macro-level variables are important predictors of PNC service use by adolescent women. However, macro-level variable explains much more of the variations in the level of PNC service use by adolescent women than does the micro-level and household-level variables. Macro-level variables are better predictors of PNC service use by adolescent women than micro level individual and household variables.

CHAPTER 9: DISCUSSION OF STUDY HYPOTHESES

9.1 Introduction

This chapter discusses the proposed study hypotheses on the basis of the study results. Each hypothesis is stated (both null hypothesis and alternative hypothesis) and then discussed in line with the findings of the study. In each case, explanations for confirmation or contradiction to the hypothesis by study results are provided.

9.2 Study Hypothesis 1

- **H_0:** There is **no** relationship between micro-level variables (i.e. age, age at birth, parity/birth order, age difference with spouse, level of education, religious affiliation, level of media access, household wealth index, level of autonomy) and adolescent women's utilization of reproductive health care services.
- **H_1:** A significant relationship exists between micro-level variables (i.e. age, age at birth, parity/birth order, age difference with spouse, level of education, religious affiliation, level of media access, household wealth index, level of autonomy) and adolescent women's utilization of reproductive health care services.

Demographic and socio-economic factors at individual-level have been found to have an influence on reproductive health seeking behaviour (Stephenson et al., 2006). Results of the study indicate that micro-level variables associated with adolescent contraceptive use in Zimbabwe include parity, residence and level of media access. Those associated with adolescent use of health facility for delivery of last child included age at birth, birth order, level of education, religious affiliation, level of media access, household wealth index and level of autonomy. Only two micro-level variables were associated with adolescent PNC service use, namely religious affiliation and level of media access. These results indicate that micro-level variables associated with adolescent reproductive health care utilisation differ with the type of reproductive health outcome. These results however are consistent with the proposed hypothesis.

9.3 Study Hypothesis 2

- H_0: There is **no** relationship between macro-level variables (provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index) and adolescent women's utilization of reproductive health care services in Zimbabwe.
- H_1: A significant and positive relationship exists between macro-level variables (provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index) and adolescent women's utilization of reproductive health care services in Zimbabwe.

This hypothesis is based on the assumption that most of the studies have ignored the importance of community-level characteristics in influencing reproductive health behaviour. Some of the studies that considered community-level characteristics used the traditional regression analysis which provided inaccurate estimates. The use of multilevel modelling simplified simultaneous multivariate analysis of individual and community level characteristics on reproductive health outcomes (Pickett and Pearl, 2001) and thus are able to determine whether community-level variables have independent effects on reproductive health outcomes.

The multilevel analyses indicate that provincial was significant and had a positive relationship with adolescent women's use of modern contraceptives, use of health facility for delivery of last child, and PNC service use. Although provincial socio-economic development index was positively associated with use of health facility for delivery and use of PNC services, it was however negatively associated with adolescent women's modern contraceptive use. The provincial quality of reproductive health care was only positively associated with use of health facility for delivery of last child. The third hypothesis is therefore partially confirmed because macro-level variables were associated with reproductive health outcomes but the direction of the relationship differed for socio-economic development index on adolescent women's use of modern contraceptives.

9.4 Study Hypothesis 3

- H_0: The level of effects of micro-level variables on adolescent women's reproductive health care utilisation in Zimbabwe will **not** depend on the macro-level in which the adolescent woman resides such as provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index.
- H_1: The level of effects of micro-level variables on adolescent women's reproductive health care utilisation in Zimbabwe will depend on the macro-level in which the adolescent woman resides such as provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index.

Community-level factors have been found to have the potential to moderate the association between individual-level factors and health service use (Wild et al., 2010; Vu, 2005). The degrees of some of the individual-level effects on health outcomes or behaviour do change as a function of some community-level effects. It was thus expected that the level of association between individual and household-level variables and adolescent women's reproductive health care utilisation will change as a function of the level of provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index.

Results from the multilevel analysis indicate that there were community-level variables that moderated the association between individual-level variables and adolescent women's reproductive health care utilisation outcomes. For example, the provincial socio-economic development acted as a modifier for the association between access to media and adolescent women's modern contraceptive use. Residing in a province with a high socio-economic development index had a decreasing effect on the association between adolescent women with high media access whereas it increased the level of association between use of modern contraceptive and those with average access to media. The association between adolescent women's education level and use of health facility for childbirth by adolescent women was moderated by the provincial quality of reproductive health care. The significant association between use of PNC services within 48 hours after delivery of last child by adolescent women and level of media access was moderated by the level of barriers to health care access at province level. These findings confirm the third hypothesis of the study.

9.5 Study Hypothesis 4

- H_0: The overall contribution of contextual effects of provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index to adolescent utilisation of reproductive health services in Zimbabwe **do not** outweigh that of micro level individual and household variables.
- H_1:The overall contribution of contextual effects of provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development index to adolescent women's utilisation of reproductive health services in Zimbabwe outweigh that of micro level individual and household variables.

This is based on the assumption that there has been a recognition that environmental settings have a significant influence in reproductive health behaviour (Babalola & Fatusi, 2009; Stephenson et al., 2006). Most studies on reproductive health utilisation concentrate on individual and household-level factors whilst neglecting community-level effects. This is important for policy considerations as reproductive interventions need to be guided on the best approaches to influence reproductive health behaviour.

Results in chapter 7 show that both macro-level variables and micro-level variable effects contribute significantly to adolescent women's use of reproductive health services in Zimbabwe. The overall contribution of individual-level variables on use of modern contraceptives by adolescent women outweighs the contribution of macro-level variables. However, the contribution of macro-level variable effects outweighs the contribution of micro-level variables effects. This hypothesis is partially confirmed in this study because it only applies to adolescent women's use of health facility for delivery of last child and adolescent women's PNC service use but it is not applicable to adolescent women's use of modern contraceptives.

CHAPTER 10: DISCUSSION

10.1 Discussion on Objectives 1 and 2

This goal of this study was to examine the independent effects of macro-level variables on use of modern contraceptives, health facility for delivery, and PNC services by adolescent women in Zimbabwe. The study also investigated the moderating effects of community-level variables on the association between individual-level variables with the use of modern contraceptives, health facility for delivery, and PNC services. It was hypothesised that a significant and positive relationship would exist between micro-level variables and adolescent women's reproductive health care utilization, as well as between macro-level variables and adolescent women's reproductive health outcomes (use of modern contraceptives, health facility for delivery, and PNC services). Although several studies have established an existing relationship between micro-level variables and use of reproductive health services, it was hypothesised that some of the macro-level variables would either moderate or intensify the effects of micro-level variables. It is also hypothesised that the contribution of community-level variable effects will outweigh the contribution of individual and household effects.

Results of this study highlight several individual and community-level factors associated with use of modern contraceptives, health facility for delivery and PNC among adolescent women in Zimbabwe. The conceptual framework discussed in Chapter 3 explains that community-level variables - such as provincial socio-economic development, provincial quality of reproductive health care and provincial barriers to health care access - are expected to have an independent influence on use of modern contraceptives, health facility for delivery, and PNC by adolescent women. Although individual and household-level characteristics are expected to influence reproductive health care use by adolescent women, the magnitude of their effect is expected to be moderated by community-level effect.

This study revealed that both micro-level variables and macro-level variables were important predictors of adolescent women's reproductive health care utilization. The variables also explained some, but not all, of the variation between provinces in Zimbabwe. Micro-level variables were better predictors of use of modern contraceptives than macro-level variables. On the other hand, macro-level variables were better predictors of use of health facility for delivery, and PNC than micro-level variables.

Findings indicate that the level of use of modern contraceptives, health facility for delivery, and PNC varied significantly across provinces in Zimbabwe. The only individual-level variable that was associated with use of modern contraceptives, health facility for delivery, and PNC was level of access to media. Media access was measured using a composite variable created from exposure to newspaper, radio and television. Findings reveal that high access to media does influence adolescent contraceptive use. There was no significant difference between those that were considered to have average access to media and those that did not have access at all. This finding, however, is in line with other studies that associated exposure to family planning messages with contraceptive use (Ekani-Besala et al., 1998; Cohen, 2000; Odimegwu, 1999; Stephenson & Tsui, 2002). Other exposures to family planning messages through other means were not considered for this study and hence this might bias the effect of media access on contraceptive use but the bias is expected to be minimal.

Consistent with other studies (Stephenson et al., 2006; Stephenson & Tsui, 2002, Ononokpono et al., 2013b), this study found a positive influence of accessing media on use of health facility for childbirth and PNC. Results indicate that high media access increased the likelihood of use of health facility delivery and PNC by adolescent women. Exposure to family planning information increases likelihood for seeking maternal care (Stephenson et al., 2006; Cohen, 2000). Young women who have high access to media sources such as the radio, television and magazines/newspapers are expected to have a high knowledge of reproductive health issues such as the advantages of seeking modern health care services and as such have relatively less risky reproductive behaviours. This is premised on the hypothesis that such media sources provide accurate information and educates the general population on such issues. This is consistent with similar findings from another study (Kwankye & Augustt, 2007).

With regard to the women's level of autonomy, observable indicators reflecting various aspects of a woman's position in the household were used to measure autonomy. The level of autonomy was not associated with use of modern contraceptives by adolescent women. The lack of association at both bivariate and multivariate analysis is contrary to previous studies which have linked women's autonomy to an increased chance of using modern contraceptives (Saleem & Bobak, 2005; Hindin, 2000; Cleland, Ali & Shah, 2006). This finding may be explained from two angles. Firstly, it may reflect the community norms that sometimes pressurise adolescents to perform their expected cultural reproductive duties of bearing

children once they enter marital union. This is an important factor and is reflected by a significant association between parity and contraceptive use. Secondly, measuring autonomy for this study did not consider including decision making on use of contraceptives and family planning as one of the aspects of a woman's position in the household. In Zimbabwe, the use of contraceptives and decision on family planning remains the subject to a man's willingness (Meursing & Sibindi, 1995). Adolescent women need to be protected by encouraging them to delay getting married. Intervention programmes need to emphasise the importance of delaying childbearing by creating an understanding and support to reduce adolescent pregnancy by encouraging them to wait until they are 20 years before they could have a child.

The likelihood of the health facility for childbirth by adolescent women increased with an increase in the level of autonomy of women. A similar relationship was revealed during the study with regards to the influence of the level of autonomy on the use of health facility for childbirth. Women with high level of autonomy were more likely to seek facility-based deliveries. In some studies autonomy and wealth were seen to interact with, and influence, reproductive behaviour (Woldemicael, 2010; Ahmed, Creanga, Gillespie & Tsui, 2010), but such an interaction was not evident in this study. Women with a high level of autonomy had a higher likelihood of using the PNC services 48 hours after their last birth as adolescents. Other literature supports this finding that women with the highest level of empowerment were more likely to seek maternal health care services (Woldemicael, 2010; Ahmed et al., 2010; Fotso et al., 2009).

Religious affiliation has been recognised as influential in fertility behaviour in other studies (Zhang, 2008; Goldstein, 1995). However, this has not been found to have any significant influence on contraceptive use in this study. The lack of association in this study may be attributed to the categorisation of variables which were influence by the size of other religions, such as the Catholics.

The study revealed that religious affiliation was an important determinant of health facility use for childbirth. Due to the sample sizes among various religious groups, adolescent women belonging to the Protestant religion were grouped together with those belonging to Pentecostal religion as they have similar beliefs on issues of reproductive behaviour. Those belonging to Traditional religions were put together with those belonging to the Apostolic Sect. The Apostolic Sect religion is the most popular in Zimbabwe and constitutes about a third of the population (ZIMSTAT & ICF International Inc., 2012). It is known to still practice pro-natalist

norms which encourage large family sizes and use of non-biomedial reproductive health services. The traditional norms and values are similar to that of Traditional religions. Other religions such as the Catholics, Muslims, Others and those with no religion were put together.

It should also be noted that unlike in other countries, the proportion of Catholics in Zimbabwe is very small and estimated at less than 10% (ZIMSTAT & ICF International Inc., 2012). Women belonging to the Traditional and Apostolic Sect, as well as the other religions (Catholics, Muslim, None and Others) were less likely use the health facility for childbirth.

Religion has been found to have an influence on PNC utilisation. Adolescent women affiliated to either Traditional or Apostolic Sect religions were less likely to use PNC within the stipulated 48 hours after delivery of last child. This finding also corroborates the findings in previous studies that linked religion to use of PNC services (Ononokpono et al., 2013b). Cultural values and beliefs have been very influential in childbearing practices from time immemorial and still continue to be very influential (Andrews & Boyle, 2002; Leininger & McFarland, 2002). In Zimbabwe, the Apostolic Sect religion combines both the Christian and African traditional cultural practices (Mpofu et al., 2011). This is why it was combined together with all the Traditional religions for comparison. Although there is evidence to suggest that religion and religiosity may have a protective effect on adolescent sexual behaviour (Willis et al., 2003; McCullough et al., 2000), this study suggests that belonging to Traditional religions including being affiliated to the Apostolic Sect may have a regressive effect on utilisation of PNC by adolescent women in Zimbabwe. The influence of religion is similar to findings from other studies elsewhere (Olusanya et al., 2010; Gyimah et al., 2006; Onah et al., 2006; Mekonnen & Mekonnen, 2003).

Adolescent women with higher parity were more likely to be current users of modern contraceptives. The influence of parity on contraceptive use is reported in other studies as well (Gilliam et al., 2011), even after controlling for community-level variables. The need to have a child once an adolescent woman is involved in a sexual union may explain the driving force behind non-use of contraceptives among adolescent women and this is in line with findings in other studies (Nagase et al., 2003). This may be an indication of pro-natalist community norms that may still be entrenched in some societies in Zimbabwe. Once an adolescent woman enters a sexual union, it is thus expected that they prove their fertility potential (Adongo et al., 1997) regardless of the reproductive health outcomes. The urge to have a first child is coming out to be the most effective factor influencing modern contraceptive use. The use of contraceptives

becomes a necessity after bearing a child, a proof that one is potentially fertile. The results do establish that once one has had a live child, then the likelihood of modern contraceptive use increases. For this study, parity seems to have the most effect on adolescent women's contraceptive use. This anomaly calls for the need to further research on the influence of other community-level influences which may mediate the relationship of contraceptive use with education levels. This may be either political or cultural factors.

Adolescent women who had a second or more birth order were less likely to use the health facility for delivery. However, birth order does not seem to influence use of PNC. The association between birth order and use of health facility is similar to findings elsewhere (Bhatia and Cleland, 1995). In most African countries, the first pregnancy is treated with high regard due to various factors. First, it's common that children are needed to validate either a marriage union and/or fulfil social and familial obligations (LeGrand et al., 2003). Second, for first time mothers, proving that one is fertile is crucial to avoid social ostracism of being childless (Adongo et al., 1997). The first pregnancy among women is usually given more attention mainly due to the inexperience of the mother with childbearing. For the adolescent women, the first pregnancy may be accompanied with fear and the socio-cultural context of the pregnancy. Consequently, adolescent women are therefore more likely to seek modern health care to ensure a successful birth (Navaneetham & Dharmalingam, 2002). Once an woman has had an experience with childbearing, they may have the confidence during the gestation period and as such may be driven to not seek assistance from the health facility (Stephenson et al., 2006; van Eijk et al., 2006).

At the individual level, women who gave birth between the age of 18 and 19 years were more likely to use the health facility for delivery than those whose age at birth was less than 18. This is consistent with a study by Reynolds and others (2006) who examined adolescent use of maternal and child health service in developing countries. Similarly, women aged less than 18 years were found to be less likely to deliver in a health facility than women aged 18 years and above in other studies (Moyer & Mustafa, 2013). Age at birth and birth order were not associated with PNC by adolescent women contrary to findings elsewhere (Sagna & Sunil, 2012; Mwaniki, Kabiru & Mbugua, 2002). Such findings however referred to women in general and hence may reflect differences in the demographic factors influencing decision to use postnatal care between adolescent women and other women.

The study revealed that the level of education of women who gave birth as adolescents was associated with use of health facility for child birth but it was not associated with use of modern contraceptives and PNC. Previous literature has linked greater education with higher levels of health facility based delivery and skilled birth attendance in Botswana (Letamo & Rakgoasi, 2003). Findings with regards to use of modern contraceptive differ from those of other studies that linked increased level of education with contraceptive use (Oye-Adeniran et al., 2006; Saleem & Bobak, 2005). Education level was also not significantly associated with postnatal care utilisation by adolescent women. These findings are not expected as education have been found to have an effect on use of maternal health care services in previous studies (Kruk et al., 2010; Gage, 2007; Sunil et al., 2006; Mekonnen & Mekonnen, 2003; Stephenson & Tsui, 2002).

Education level is a source of economic resources and usually empowers women to take charge of their own wellbeing and health. A combination of high level of education as well as better household wealth index facilitates easy access to better quality maternal health care as revealed elsewhere (Aremu et al., 2011).

Other individual socio-economic variables such as residence, household wealth index and level of autonomy did not have any influence on adolescent women's contraceptive use as would have been expected. Adolescent women residing in rural areas were more likely to use modern contraceptive than their urban counterparts. This is unexpected but the finding that the likelihood of contraceptive use tends to increase once women have given birth might explain this scenario. Adolescent women residing in rural areas are more likely to have given birth than those in urban areas. This study also demonstrates that adolescent woman's socio-economic circumstances, such as education, household wealth index, and level of autonomy may not independently be accurate predictors of contraceptive use as also shown in other studies (Gakidou & Vayena, 2007; McNay et al., 2003). Findings on the association between individual-level variables and use of modern contraceptives by adolescent women should be considered with caution. For example, the level of education had only two categories (primary/no education versus secondary and above); the household wealth index was divided into three categories instead of the usual quintiles.

Household wealth index was also not significantly associated with postnatal care utilisation by adolescent women. These findings are not expected as household wealth index have been found to have an effect on use of maternal health care services in previous studies (Kruk et

al., 2010; Gage, 2007; Sunil et al., 2006; Mekonnen & Mekonnen, 2003; Stephenson & Tsui, 2002).

10.2 Discussion on Objectives 3, 4 and 5

The main focus of this thesis was to examine the independent effects of macro-level variables on use of contraceptives, health facility for delivery and PNC by adolescent women. The thesis also focused on the moderating effects of community-level variables on the association between individual-level variables and use of modern contraceptives, health facility for childbirth and PNC. The contribution of community-level variable effects was compared with the contribution of individual-level effects on use of reproductive health outcomes.

Provincial socio-economic development index had an independent effect on use of health facility for delivery and PNC by adolescent women in Zimbabwe. Adolescent women residing in provinces with high socio-economic development were more likely to use the health facility for childbirth. The importance of the neighbourhood socio-economic context in influencing health has been demonstrated in other studies (Pickett & Pearl, 2001). A change in the provincial socio-economic development index from low to high would result in an increase of 31.3% in the probability of using a health facility for childbirth by adolescent women in Zimbabwe. Provincial socio-economic development index was derived through principal component analysis using the following variables: the proportion of women with two or less children in the province, the proportion of women in the community with at least secondary education, the proportion of women in the province who delivered their last child in a health facility during the five years preceding the survey, the proportion of women participating in the labour force, and the proportion of women above 20% household wealth quintile.

The results may highlight the following relationships; that high levels of health facility deliveries are expected in communities with low fertility, high proportion of women with at least secondary education, high proportion of women with institutional deliveries, high proportion of women participating in the labour force, and a very low proportion of women living below poverty levels. This finding calls for policy makers to ensure development of

strategies to ensure socio-economic development of provinces in order to improve on the level of use of health facility for child birth by adolescent women.

Residing in provinces with a high socio-economic development index had an independent effect on postnatal care utilisation within 48 hours of delivery of last child by adolescent women. This relationship is consistent with findings elsewhere where socio-economic development context was found to be associated with use of maternal health services (Aremu et al., 2013; Stephenson et al., 2006). A change in the provincial socio-economic development index from low to high would result in an increase of 17.9% in the probability of using postnatal care services by adolescent women in Zimbabwe. Derivation of the provincial socio-economic development index involved the use of several socio-economic indicators at province level such as the proportion of women with at least secondary education, proportion of women with at most 2 children ever born, proportion of women who gave birth to their last child at the health facility, proportion of women participating in the labour force and the proportion of women who live above poverty level. Provinces with a high socio-economic development index would often have high proportions of women in all the socio-economic indicators used to develop the provincial socio-economic development index. A province with a high socio-economic development index may reflect high proportions of households with a better socio-economic status. Policies aimed reducing socio-economic inequalities between provinces should be implemented with the intention to increase the likelihood of using postnatal care.

Although provincial socio-economic development was associated with use of modern contraceptives by adolescent women, it had moderating effects on the association between high media access and use of modern contraceptives. The association between high media access and use of modern contraceptives changed as a function of the level of the provincial socio-economic development index. In provinces that had high socio-economic development, adolescent women with no media access were associated with higher odds of modern contraceptive use and in provinces with low socio-economic development index; adolescent women with no media access were more likely not to use modern contraceptives.

The provincial barriers to health care access had independent effects on use of modern contraceptives and health facility for delivery. On being introduced into the models, there was a change in the variance of the random intercept indicating that the community characteristics did contribute to the variance in use by adolescent women in Zimbabwe. Adolescent women

residing in communities with higher provincial barriers to health care access were more likely to report using modern contraceptives. The change in the level of provincial barriers to health care access from low access to high access resulted in 10% increase in the probability of using modern contraceptives among adolescent women in Zimbabwe. This is in line with several findings that purport that modern contraceptive use may be hampered by lack of access to reproductive health services (Seiber & Bertrand, 2003). It also demonstrates that even if adolescent women stay in an environment where women experience hardships in terms of accessing health care, the use of modern contraceptive may still be influenced by other factors.

Findings from the multilevel models indicate that adolescent women residing in provinces that have high barriers to health care access were more likely to use the health facility for childbirth. The change in the level of provincial barriers to health care access from low access to high access resulted in 32.3% increase in the probability of using health facility for delivery among adolescent women in Zimbabwe. This finding corroborates other findings elsewhere (Tanser, Gijsbertsen & Herbst, 2006; Buor, 2003). The comparison should however be treated with caution because access is defined differently and may have different implications for various reproductive health settings. In Africa, access to health care is usually conceptualized using distance based measures. For example, Buor (2003) related distance to utilisation of health services in Ghana whereas Tanser et al. (2006) used the geographical information system to model primary health care accessibility to utilisation in South Africa. In these studies, access is defined and captured using geographical dispersion but the non-spatial domain of accessibility is not captured yet it contributes to being a barrier to utilisation of reproductive health services including using the health facility for childbirth. The non-spatial may refer to the demographic, socio-economical and organizational factors (Yao, Murray & Agadjanian, 2013).

Provincial barriers to health care access index in this study is derived from the provincial proportion of women who report at least one problem accessing health care. The advantage with this approach is that it captures the perceived barriers covering four domains ranging from the household to the nearest health facility. The questions used cover areas including getting permission, affordability, distance and transportation barriers. Yao, Murray & Agadjanian (2013) have suggested exploring other alternative measures of accessibility. Although one of the domains used to conceptualize provincial barriers to health care access is similar to the ones used in other studies, the approach to measuring access is, however, extend

beyond spatial dimensions. This is one of the strengths of the study and it is the first time that this approach has been used using multilevel analysis.

Although provincial barriers to health care access was found to be associated with PNC use by adolescent women, it did not have an independent effect on PNC use by adolescent women. However, the contribution of the contextual effect on PNC by adolescent women would depend on the proportion of adolescent women with high media access. This may mean that positive efforts made by the impact of media access on use of reproductive health services may be compromised by challenges in accessing health care. This has implications since women who may have been influenced to utilise PNC services through media may have been hindered to use services due to issues relating to access to health care. Other studies however found contextual access to be an important determinant of use of maternal health services (Tanser et al., 2006; Buor, 2003; Diez-Roux, 1998). Methodology for measuring barriers to health care access was however not consistent for most of these studies. Most of these studies however emphasise distance and health infrastructure resources to measure health care access.

The positive influence of health service characteristics on contraceptive use has been revealed in other studies (Hamid & Stephenson, 2006; Sanogo et al., 2003; Seiber & Bertrand, 2003; RamaRao et al., 2003; Blanc et al., 2002). This study, however, used nine reproductive health service characteristics to measure quality of reproductive health care. Unlike in other studies, quality in health care at community-level did not influence use of contraceptives by adolescent women. Provincial quality of reproductive health care did not have an independent effect on the use of modern contraceptives by adolescent women nor was it associated with contraceptive use. It was however associated with use of health facility for childbirth. The higher the provincial quality of reproductive health care the higher the propensity of using the health facility for childbirth by adolescent women.

The provincial quality of reproductive health care was a composite variable created to come up with an average number of basic reproductive health services per province offered to a woman who has gone through a pregnancy during the five years prior to the survey. Basic reproductive health services covered a total of nine items that included examination during ANC, the counselling or education given, treatment and supplies given and the type of assistance during delivery, and PNC.

Although quality of care is multidimensional, there is still no agreement as to which components should be included in defining quality of care (Creel, Sass & Yinger, 2002). For this study, it was essential that we include components that have a direct bearing on utilisation of reproductive health services. It is possible that the more the number of reproductive health care services provided to clients, the more likely it is for clients to perceive it as good. The perception of good quality of health care by clients may be influenced by social and cultural concerns as well. Where there is a perceived good quality of care, women tend to disperse information about the advantages of using a health facility for childbirth. Dispersion of health information in a community with low quality of health care could be poor and women in such areas are more likely to stick to the traditional way of giving birth as it may be deemed natural (Rockers et al., 2009; Montagu, 2011). The need to ensure that women are provided with all the basic reproductive health care services is essential. That can be achieved through ensuring efficient support systems by program managers and ensuring that skilled providers have the technical competency to provide reproductive health care services at the health facility.

Provincial quality of reproductive health care was not associated with PNC use by adolescent women. Previous studies have revealed that the previous poor quality experiences with the reproductive health care use may lead to non-use of subsequent reproductive health care services (Faye, Niane & Ba, 2011). Although measurement approaches were not similar, the importance of quality of care is revealed. The 2010/11 ZDHS report (ZIMSTAT & ICF International Inc., 2012) indicates that the level of use of ANC by adolescent women is very high and yet the level of PNC is not pleasing. This may be attributed to either individual-level experience during the ANC period or there are other explanations which may be cultural in nature.

Although the provincial quality of reproductive health care was associated with use of health facility for childbirth, it did not have an independent effect of use. The provincial quality of reproductive health care operated through the level of education of the adolescent women to effect use of health facility for childbirth. During the multilevel modelling, results showed that the addition of community-level characteristics in the models was necessary in order to achieve a better explanatory model for use of health facility for childbirth among adolescent women.

Findings indicate that the predicted probability of using modern contraceptives due to a change of community-level characteristics is less significant than due to individual and

household-level factors. Whilst a change in the provincial barriers to health care access from low to high contributed to an increase of 10% in the predicted probability of using modern contraceptives, the change in the level of media access from no media access to high media access resulted in an increase of 13%, whereas a change in parity from no child to at least one child resulted in an increase of 45.9%. The change in the predicted probability of using health facility for delivery and PNC by adolescent women due to a change in community level characteristics was more significant than that of the individual and household level characteristics. Among individual-level variables, a change in the predicted probability of using the health facility for delivery ranged from 1.1% to 23.1% whereas that of community-level variables hovered above 30%. The predicted probability for a change in the provincial socio-economic development index from low to high resulted in an increase of 17.9% in the predicted probability of utilising PNC services. A change from no media access to high media access as well as from low to high autonomy level resulted in an increase of 8.1% and 10% respectively.

In conclusion, both the individual-level and community-level characteristics explained some variation in the use of modern contraception, health facility utilisation for childbirth, and PNC between provinces across provinces in Zimbabwe. However, community-level characteristics were better predictors of use of health facility for delivery and PNC than individual-level characteristics. But, individual-level variables were better predictors for use of modern contraceptives. This study indicates that understanding the reproductive health needs of adolescent women goes beyond understanding of their individual-level characteristics. Some of the factors influencing adolescent women to utilise reproductive health care services at provincial level need exploring further. More important is that this study reveals that community-level characteristics are more important predictors of some of the adolescent women reproductive health care outcomes and that policies on reproductive health care implemented at provincial level can bring about an improvement in maternal health.

Although the level of media access has an impact on increasing contraceptive use it is compromised by socio-economic development. This means that socio-economic development is more important in influencing adolescent women's contraceptive use. The study also showed that positive efforts made by the impact of media access on use of reproductive health services may be compromised by challenges in accessing health care. This has implications

since women who may have been influenced to utilise postnatal care services through media may have been hindered to use services due to issues relating to access to health care. Another important finding in this study is that the positive impact of education on the use of health facility for delivery was elevated by higher provincial quality of reproductive healthcare.

10.3 Methodological Issues

10.3.1 Strengths of the Study

This study has an advantage of using the DHS data to analyse the determinants of adolescent women utilisation of reproductive health care services in Zimbabwe. DHS data has been recognised as one of the most accurate and high quality data available, high response rates and high quality interviewer training in low to middle income countries. It uses a multistage probabilistic sampling process which ensures national coverage by selecting clusters and households from a geographic-based sampling frame that also ensures rural/urban representation (Corsi et al, 2012; Fabic et al., 2012). Findings from studies using DHS data have the advantage of comparing demographic and health estimates cross-sectionally and overtime because data collection procedures for DHS surveys are standardised across countries. The data source also allows for a multilevel analysis, a robust observational method that has already been used in other studies (Ononokpono et al., 2013; Aremu et al., 2011; Kaggwa et al., 2008; Stephenson et al., 2006). Therefore, DHS provided a rich data source for this study as it combines individual-level data on socio-economic and demographic characteristics with health data that covers health behaviours, as well as community-level data. Most governments and researchers in less developed countries have used DHS data extensively to support evidence-based policy development (MEASURE DHS, 2009). Most of the planning and monitoring of health and development programmes in such countries also use DHS data. One of the goals of this study is to use findings to influence policy change and intervention with intention to improve adolescent women's utilisation of reproductive health care services in Zimbabwe.

This study uses robust observational data analysis method of multilevel analysis to establish the determinants of adolescent women's use of reproductive health care services.

Health behaviour, health and disease occur in socio-economic contexts yet so much research that examined the determinants of health behaviour concentrated on individual characterization at the exclusion of context (Stephenson et al., 2006). Using multilevel analysis instead of the traditional regression analysis provides an opportunity to obtain valid point estimates for the parameters and corrects standard errors for the point estimates by removing the effects of clustering (Goldstein, 1995). This study uses nested data where adolescent women are nested within provinces in Zimbabwe. The use of multilevel analysis is appropriate here as it allows the study of the effect of variables at different levels of the hierarchy and so the level at which the greatest variation resides can be determined (Diez-Roux, 2000). To have the greatest effect, any reproductive health programme intervention need to be targeted where it would have the greatest impact in influencing adolescent women's utilisation of reproductive health care services. The level of the hierarchy at which interventions may have the greatest achievement would be provided through use of multilevel modelling. Such modelling also separates the compositional effects from contextual effects.

Several multilevel studies use data from different sources for individual-level and community-level characteristics respectively to examine determinants of reproductive health behaviour. Such data would have a time lag between individual-level and community-level characteristics. Such studies are prone to bias because individual-level data may have been gathered at a time when there had been significant socio-economic developmental changes. All societies do have their own socio-economic developmental trajectories. This study uses data from the same DHS survey and as such the reference time for measurements of both the individual characteristics and community characteristics is the same. The processes involved in data gathering are also the same for both levels therefore the information regarding the individual reproductive health care utilisation behaviour coincided with the information on their communities.

This study has made a substantial contribution to research as it provides evidence of the importance of simultaneously examining the effects of both community and individual-level variables on reproductive health care utilisation by adolescent women. The approach assisted in distinguishing between associations that are "compositional" in nature and those that are "contextual" (Vu, 2005). During this study, various aspects of community characteristics and their effects on reproductive health care utilisation by adolescent women permitted for more complete tests of theories. It also provided evidence that various aspects of the community-

level characteristics may be targeted for policy intervention for some aspects of adolescent women reproductive health care utilisation and not necessarily for all the reproductive health care utilisation outcomes.

Studies have shown that reproductive health care interventions at community-level do bring about an effective impact in improving maternal health (Kidney et al., 2009). It is therefore necessary to have analysis of factors that affect reproductive health care service utilisation at provincial level because in most cases, policies are implemented at provincial level. This study examines the effects of provincial quality of reproductive health care, provincial barriers to health care access and provincial socio-economic development on utilisation of adolescent women reproductive health care utilisation.

Improving the existing quality of health care is a central concern in the international discussion of reproductive health (RamaRao & Mohanam, 2003). Most studies conceptualise quality as a multidimensional concept but they lack a uniform definition (Becker et al., 2007). RamaRao and Mohanam (2003) assert that quality of health care requires well equipped clinics with skilled health personnel where clients are treated considerately and provided with a variety of appropriate services. Although researchers do not agree on which aspects should be considered when defining quality, quality of health care has historically been defined at clinical level which encompasses providing technically proficient, effective, safe care that contributes to the client's well-being (Creel et al., 2002). There is however limited literature on the relationship between community-level quality of health care and reproductive health care utilisation. Due to data limitations, this study did not cover the readiness of the care. However, all public and private health clinics in Zimbabwe are manned with trained health personnel. The primary health care system is such that clinics provide ANC and PNC services and make referrals to higher level health centres. Health centres also make further referrals to district or provincial hospitals for advanced management and treatment of reproductive health complications. This study uses data that had direct linkage to reproductive health care utilisation. The data required included the reproductive health care services provided to the women during ANC, delivery and PNC as reported by women who had their last birth during the five years preceding the survey and this was measured at provincial level. The assumption here is that women who have received all the basic reproductive health services during ANC, delivery and PNC are more likely to view such services in a positive light. An environment where women views reproductive health care services provided positively would more likely

influence women to utilise reproductive health care services. This study provides evidence that by just using data provided by clients on the reproductive health care provided to them, it is possible to link the community-level quality of reproductive health care and utilisation.

Another issue of importance for this study is the measurement of provincial barriers to health care access. There is a vast of literature on the relationship between access to health care and reproductive health care utilisation (Becker et al., 2007). There is no universal definition of access to health care. Some authors have used utilisation of health care services as a proxy for access whereas some focus on the probability that someone gets a health service when they need it. Another dimension involves the perception of whether an individual receive health care service when they want it. McIntyre et al. (2013) describes access to health care as a multidimensional concept based on the interaction between health care systems and individuals, households and communities. There are other aspects of access that are important such as the interaction between individuals and health providers as Gilson indicated (Gilson, 2006). Most researchers use one dimension to define access, for example, some use distance to the nearest health facility whereas some focus on the availability of health infrastructure and resources. This study uses the barriers to health care access by women to measure provincial level of access to health care. Questions on perceived access to health care cover barriers that may delay women to access health care from the household-level to issues related to the health care infrastructure. The first delay may be at household-level where decision making may hinder women to access health care. This is covered by a question on perceived problems getting permission at household level. The other delay may be influenced by the individual and community resources such as perceived affordability to get health care and perceived distance and transportation problems. This approach ensured coverage of several dimensions of barriers to health care access unlike other studies.

Measurement of socio-economic development indices have always been involved a combination of variables indicating socio-economic status of individuals, families and households within an area. The indicator measures the availability of resources either in the form of economic and human capital (Singh et al., 2001). Almost all the studies that examined the effects of socio-economic development index on health did not include level of childbearing as a development indicator in their computational procedures to compute the index (Aremu et al., 2011; Kirby & Kaneda, 2005; Singh et al., 2001)). In developed countries, the level of childbearing has reached a point where it does not explain socio-economic status of individuals and regions hence may not be used to explain socio-economic development

indices. In some developing countries, levels of childbearing still provide a picture of socio-economic development. Disparities in fertility between regions within some SSA can still be explained by socio-economic theories and the demographic transition theory. This study measures the provincial socio-economic development index using a combination of variables that included the level of childbearing as a socio-economic indicator.

There is still no doubt that use of specialised skilled health professional for PNC remains the most crucial practical intervention that can contribute significantly to lowering maternal deaths in developing countries, let alone in Zimbabwe. Despite this, the use of PNC services still remains very low in Zimbabwe with adolescent women having lower rates of use 2010 (ZIMSTAT & ICF International Inc., 2012) although they have higher risks of dying due to maternal causes compared to other women. Nonetheless, there is still limited knowledge on the determinants of postnatal care (Langlois et al., 2013) and the strength of this study is that it has included examination of factors influencing postnatal care both at individual and community level. This is an important research contribution not only to Zimbabwe but also to developing countries more especially in sub-Saharan Africa, a region with the lowest postnatal care utilisation among women.

10.3.2 Limitations of the Study

Results from this study are important but must be read with the consideration of limitations that are discussed in this section. First, the source of data on reproductive health care utilisation by adolescent women was based on self-reports by respondents. The use and type of contraception, use of health for childbirth, and use of PNC services could not be validated by use of an objective source such as health facility cards. For example, there were no family planning cards to corroborate use of contraceptives, and no checking of obstetric cards for utilisation of health facility and postnatal checks. Although there is growing empirical evidence to suggest that self-reports are susceptible to numerous errors, it is however logical to assume that the ability of women to recall pregnancy-related events will far outweigh that of recalling other health behaviours (Babalola & Fatusi, 2009).

Second, as with other studies, this study has problems of confounding. Due to data limitations, control for the effects of potential confounding was limited to a maximum of nine individual level variables available in the 2010/11 ZDHS through use of multivariate analysis for all three outcome variables. Other potential confounding variables for adolescent women's

reproductive health care utilisation such as attitudes towards health care services, perceptions about health care systems, fear/embarrassment of being shamed, knowledge of pregnancy risk factors, knowledge and beliefs about aetiology of diseases, and so on, were not included and as such may have compromised parameter estimations for both the individual and provincial level variables. The confounding effect at provincial (community) level for this study may be due to the sampling process and as such it is referred to as the "selection bias" (Vu, 2005). For multilevel settings, applications dealing with selection of samples are uncommon (Bellio & Gori, 2003, Borgoni & Bittari, 2002) and there has not been any systematic study on selection bias on multilevel models. For the 2010/11 ZDHS, the sample was selected using a two-stage sampling design to ensure that the number of clusters (EAs or Enumeration Areas) in each province is determined is such a way to provide adequate sample for each province in Zimbabwe. Such sampling design involved additional and unexpected problems for this study because the aim of the survey was to capture an adequate number of eligible men and women and not necessarily adequate number of adolescent women for each cluster 2010 (ZIMSTAT & ICF International Inc., 2012). As such, the hierarchical structure of the data for adolescent women is modified and this may compromise the measurement of parameters at all levels and even bias the ICC. For this study, measurement of parameters at lower levels such as district, enumeration areas (EAs) and household levels could not be ascertained due to the small sample sizes at these levels.

Third, the multilevel modelling approach may have its own limitations because it assumes that all relevant individual-level predictors have been considered. During multilevel modelling, the provincial (community) level effects identified may simply reflect unaccounted for individual-level predictors or more generally, misspecification of the individual-level model (Diez-Roux, 2000; 1998). Another limitation is the non-existence of multilevel models exhibiting the possibility that individual-level properties may influence community level variables. This also goes for modelling the possibility that provincial (community) level characteristics may shape individual level independent variables.

Fourth, the research design for this study is quantitative in nature and quantitative analysis has limitations of its own. The approach reveals measurements that provide meaningful information about the subject matter but lack insight as it works within a certain set of parameters. To inform effective and sustainable policy development, we need to understand why adolescent women utilise reproductive health care services but this was outside the scope

of this study. A combination of the two methods would shed light into the mechanism of the contextual effects and how they influence adolescent women's reproductive health care utilisation in Zimbabwe.

Fifth, multilevel model analysis assumes that data on provincial (community) level characteristics at the time of interview do not vary with the characteristics at the time of reproductive health care utilisation by adolescent women. One of the major limitations of this study is that adolescents have a high propensity to migrate. Multilevel modelling assumes that provincial-level characteristics have been unchanging overtime and that reproductive health care utilisation by adolescent women are influenced by such provincial characteristics. Adolescence is a stage characterised by the will to achieve independence from parents and as a result, adolescents tend to move from place to place looking for educational and economic opportunities. It is thus possible that adolescent women found residing in a province at the time of interview may have been residing in another province at the time of their reproductive health care service utilisation event such as childbirth or PNC. It is therefore possible that bias may have been introduced and in the process presents a threat in compositional effect on utilisation of reproductive health care services. As a consequence, the independent effects of provincial quality of reproductive health care, barriers to health care access and socio-economic development may have been misestimated. Generally, migration in Zimbabwe is a big issue due to the political instability bedevilling the country. Migration in Zimbabwe is characterised by localised movements from rural provinces to cities such as Harare and Bulawayo as well as international movement from Zimbabwe to neighbouring countries such as South Africa, Botswana and overseas. However, movement by adolescent women who have already initiated sexual activity is more likely to be lessened because marriage among young women aged 15 to 19 years that have initiated sexual activity is very high in Zimbabwe (Singh et al., 2000).

Sixth, community-level variables in this study are measured at the level of provinces which are defined by political boundaries which do not necessarily coincide with the same community boundaries. The multilevel modelling approach assumes that adolescent women belonging to the same province in Zimbabwe are exposed to the same community effects and that two differing communities with contrasting characteristics will have differing adolescent women's utilisation levels. However, there is diversity within provinces in terms of quality of reproductive health care, barriers to health care access experiences and socio-economic

development index. Some provinces have both rural and urban settings within, hence the diversity. Due to data limitations, multilevel analysis at the district and household-level was not possible as the sample size of adolescent women at district and household level were too small to compute the variance of the random intercept at those lower levels. This has the potential to violate the assumptions governing multilevel modelling and ultimately bias the ICC. However, the degree of diversification within provinces in terms of context is assumed to be minimal with insignificant effect on parameters.

Seventh, this study uses cross-sectional 2010/11 ZDHS data which poses difficulties in establishing a cause effect relationship between provincial (community) level variables and reproductive health care service utilisation outcomes. The inability to determine the temporal order of reproductive health care utilisation outcomes by adolescent women and explanatory variables calls for the need to have longitudinal or robust research designs to establish causality.

Eighth, there is evidence from literature that adolescent women younger than 15 years engage in high risk sexual behaviour but the 2010/11 ZDHS data did not cover adolescents aged 10 to 14 years. This is a limitation because this means that adolescents have been under represented in the analysis.

Ninth, an assessment on the quality of data has revealed evidence of systematic exclusion of adolescent women in the 15 to 19 year old age bracket during the 2010/11 ZDHS. This may have a bearing on the estimates for this study because potential adolescent women eligible for interview may have been selectively excluded to participate in the individual interviews. It is however assumed that such selective exclusion of the 15 to 19 year olds was distributed evenly across provinces and various other groups and thus will have minimal effect on the parameters.

Lastly, one of the community-level variables investigated included the provincial barriers to health care access which was derived by using a set of four questions regarding barriers to health care access. Due to data limitations, the variable was measured by asking women whether the following four areas would pose a big problem or not when they get sick and want to get to get advice or treatment: (1) getting permission to go to the doctor, (2) getting money needed for advice or treatment (3) the distance to the health facility and (4) transportation. It is not clear whether the perception that these areas have effective influence on adolescent women's reproductive health care utilisation than the actual experience in these four areas.

Future research need to look at these areas to establish if indeed perceptions are more potent than actual experiences.

CHAPTER 11: CONCLUSION AND RECOMMENDATIONS: POLICY, PROGRAMME AND RESEARCH

11.1 Research Conclusions and Policy Implications

This research study set out to examine four major questions:

Research Question 1: What are the levels and determinants of reproductive health care service utilisation of adolescent women in Zimbabwe?

Research Question 2: To what extent is adolescent women's reproductive health care utilisation a function of quality to health care, barriers to health care access and socio-economic development independent of the adolescent woman's individual-level characteristics in Zimbabwe?

Research Question 3: What are the effects of the macro-level variables on adolescent women's reproductive health care utilisation in Zimbabwe?

Research Question 4: Do macro-level variables moderate the association between micro-level variables and adolescent women's reproductive health care utilisation?

To answer these four research questions, specific research objectives were addressed for the following three reproductive health care service utilisation outcomes by adolescent women: modern contraceptive use, use of health facility for delivery (childbirth) and PNC service utilisation (within 48 hours after delivery of last child by adolescent women). Use of ANC outcome was not covered in this study because of the high level of use of ANC in Zimbabwe by adolescent women which stood at 86.4%.

In general, analytical results for the specific objectives for this study are summarised as follows: 1) Levels of reproductive health care service utilisation by adolescent women still remain low and such levels vary significantly by province in Zimbabwe, 2) Use of health facility for delivery of last child was a function of provincial barriers to health care access and socio-economic development independent of adolescent woman's individual characteristics. Use of modern contraceptives was a function of provincial barriers to health care access which is independent of the woman's individual-level variables. PNC service utilisation was also a

function of provincial socio-economic development which was independent of the women's individual-level characteristics. 3) Variation in utilisation of reproductive health care by adolescent women between provinces is partly ascribed to provincial characteristics. Provincial characteristics are more important predictors of use of health facility for delivery, and PNC utilisation than individual-level characteristics. Individual-level characteristics seem to be more important in determining modern contraceptive use among adolescent women than provincial characteristics. 4) Provincial characteristics act as moderators for the association between adolescent women's individual level characteristics and reproductive health care utilisation.

This section of the study discusses major findings of the research by reproductive health care utilisation outcome and also discusses policy implications of the findings.

11.1.1 Use of modern contraception

The level of modern contraceptive use by adolescent women in Zimbabwe stood at 35.4% and varied from 27% in Harare province to 41.7% in Mashonaland West. The use of modern contraceptive by adolescent women is 22% lower than that of women in general in Zimbabwe, which stood at 57.3% in 2010 (ZIMSTAT & ICF International Inc., 2012). This is indicative that adolescent women in Zimbabwe are more likely not to use modern contraceptives as compared to other women. The findings also indicate several urban areas experiencing lower levels of modern contraceptive use by adolescent women than rural areas. Two main cities in Zimbabwe which have been given a provincial status, Harare and Bulawayo are the ones that have the lowest modern contraceptive use by adolescent women. This has programmatic implications as evidence from the results shows that adolescent women are lagging behind in terms of modern contraceptive use. From a programme delivery and policy making perspective, there should be more emphasis on encouraging adolescent women to use modern contraceptive as this will contribute significantly towards achieving SDG 3 of reducing maternal mortality. Addressing this anomaly will reduce the levels of adolescent pregnancy and ultimately the burden of negative reproductive health outcomes since adolescent women have higher odds compared to their older counterparts (Lloyd, 2005; Reynolds & Wright, 2004). This encouragement should also ensure that there is equal provincial coverage in addressing the lack of modern contraceptive use by adolescent women.

Results of the study indicate that parity and level of media access were associated with modern contraceptive use by adolescent women. The level of use of modern contraception increased with parity of the adolescent women. Parity seemed to play a significant role in contraceptive behaviour of adolescent women in Zimbabwe. The need to have a child once a woman becomes sexually active seems to outweigh the health and socio-economic disadvantage of early childbearing. Adolescent women need to be protected by encouraging them to delay getting into sexual unions or getting married. Intervention programmes need to emphasise the importance of delaying childbearing by creating an understanding and support to reduce adolescent pregnancy by encouraging them to wait until they are 20 years before they could have a child.

Adolescent women with high level of media access were more likely to be users of modern contraceptives than adolescent women with no media access. However, the association between high level of media access and adolescent women's modern contraceptive use was moderated by the socio-economic development of the province in which adolescent women resided. This means that elevation in the likelihood of use of modern contraceptives associated with level of media access changed as a function of the level of socio-economic development of the province in which the adolescent women lived. So, adolescent women with no access to media who lived in a province with high socio-economic development was more likely to use contraceptives but would be less likely not to use modern contraceptives if they lived in a province with low socio-economic development index. High media access in this study was measure by creating a composite variables derived from the frequency of access to newspaper/magazine, radio and television. Studies have associated assorted the level of media access at individual-level with household wealth (Ahmed et al., 2010; Woldemicael, 2010). This study however did not find any significant correlation between household wealth index and level of media access.

High level of access to media is often associated with likelihood of modern contraceptive use (Cohen, 2000; Ekani-Bessala et al., 1998). Most of these studies were done at the individual level and downplayed the important role of macro-level influences, such as the socio-economic development on modern contraceptive use. Measuring provincial socio-economic development index entailed the use of PCA using five variables; namely: 1) proportion of women with 2 or less children ever born, 2) proportion of females with at least secondary education; 3) proportion of women who delivered their last child in a health facility

and 5) proportion of women participating in labour force and 6) proportion of women living above poverty level (20% or more household wealth quintile). The moderation of the association between level of media access and adolescent use of modern contraceptives by the provincial socio-economic development implies that adolescent women with no media access would benefit greatly if provinces could be further socio-economically developed. Provincial socio-economic development may entail policy makers designing programs that encourage low fertility, attainment of at least secondary education by women, use of health facility for delivery of children, women's participation in the labour force and reducing poverty levels. Thus, socio-economic development of provinces provides an informed intervention to address the gap provided by lack of media access at individual level in influencing adolescent women's use of modern contraceptives.

The results from this study demonstrate that provincial barriers to health care access had an independent effect on adolescent women's use of modern contraceptives. The independent effects remained so even after taking into account the individual level characteristics of adolescent women. However, findings from this study indicates that the contribution of macro-level variables is lesser than that of micro-level variables. Through the use of level 1 and level 2 multilevel model logit equations and deriving the antilog from the values in both the exposed and the unexposed for each variable, predicted probabilities of utilising modern contraceptives by adolescent women were computed. Results indicate that both micro-level and macro-level contextual variables are important in determining use of modern contraceptive by adolescent women. However, the individual-level variables considered in this research provide a much larger province-level variation than the community-level variables considered in use of modern contraceptives by adolescent women. This indicates that individual-level variables were more important predictors of adolescent women's contraceptive use than macro-level variables. Policy makers and reproductive health designers should consider the importance of both micro and macro-level variables. At individual-level, encouraging adolescent women to delay getting into sexual unions would reduce early childbearing given the traditional and cultural pressures adolescent women experience.

11.1.2 Use of health facility for delivery

From the women who delivered their last child as adolescents during the five years preceding the survey, 63.7% did so in a health facility. The level of use of health facility for

delivery of last child was similar to that of Zimbabwean women in general which stood at 65.1%. The proportion of adolescent women who delivered in a health facility varied significantly by province and ranged from 47.3% in Mashonaland to 88% in Bulawayo.

Findings from the study indicated that micro-level variables associated with use of health facility for delivery of last child by adolescent women included age of women at birth, birth order, education, religion, level of media access, household wealth index and level of autonomy. Women whose age at birth was less than 18 year and those whose birth was the second or more (birth order 2 or more) were less likely to use the health facility for delivery of their last child. The odds of using health facility for delivery of last child by adolescent women were higher for those with secondary or higher education and those with high autonomy. An increase in the level of household wealth, as well as the level of media access, increased the likelihood of using the health facility for delivery of last child. In term of religion, adolescent women belonging to Traditional/Apostolic religions and Catholics/Others were less likely to have used the health facility for delivery of last child as compared to adolescent women affiliated to Protestant and Pentecostal religions. There is evidence that reproductive health programs aimed at encouraging adolescent women to use the health facility for childbearing should take consider the importance of individual level variables. One important finding from this study is the increased likelihood of use of the health facility whose intensity increased as a function of the level of interaction with the provincial quality of reproductive health care in which adolescent women resided. This interaction is discussed below when moderation of macro-level variables on the association between micro-level variables is presented.

Results from the study established that provincial barriers to health care access and provincial socio-economic development index had an independent effect on use of health facility for delivery of last child by adolescent women in Zimbabwe. The odds of use of health facility for delivery by adolescent women increased by residing in provinces with high barriers to health care access as well as residing in provinces with a high socio-economic development. To measure provincial barriers to health care access, a set of questions were asked women to gauge the perceived personal difficulty in accessing health care when they are sick. The questions asked ensured that barriers to access cover a wide range of areas such as ability to go for treatment, affordability, distance to health facility and mobility (transportation). Any woman experiencing at least one of the problems accessing health care was regarded as having

a barrier accessing health care. A province with a high proportion of women experiencing at least one major problem accessing health care was regarded as having low barriers to health care access and a province with a low proportion of women was regarded as having high barriers to health care access. This variable has some included some aspect of cultural expectations that include getting permission to access health care. Intervention programs need to look at the aspects of provinces that may hinder access to health care such as cultural norms, physical accessibility and provision of transportation facilities to health facilities.

Another finding is the importance of independent effect of provincial socio-economic development on use of health facility for delivery by adolescent women. As earlier mentioned, the provincial socio-economic development index was developed through the use of the principal component analysis procedure. Policy interventions that should be made to increase the likelihood of using the health facility for delivery by adolescent women must emphasise improvement in the provincial socio-economic development. This may include strategies that encourage use of health facility for delivery, attainment of secondary education for women, fertility reduction, women's labour participation and poverty reduction efforts.

Results indicate that macro-level variables moderated the association between micro-level variables and use of health facility for delivery by adolescent women. Cross-level interaction test indicated that there was significant interaction between provincial quality of reproductive health care and level of education. Although the provincial quality of reproductive health care was associated with use of health of facility for delivery by adolescent women, it operated through the level of education. The study revealed that the increased odds of using the health facility for delivery associated with secondary or higher level of education changed as function of the level of quality of reproductive health care within the provinces. This suggests that if an adolescent woman with secondary education or more resided in a province with a high quality of reproductive health care, then the likelihood of using the health facility for delivery would be enhanced or elevated.

For this outcome, the overall contribution of macro-level variable effect to utilisation of health facility for delivery was compared with the contribution by micro-level variable effects. The contribution for each of the variables was computed by determining the difference between the predicted probability of using a health facility by adolescent women with a specific characteristics and the predicted probability of using a health facility for delivery by adolescent women without that particular characteristics whilst holding other variables

constant around their means. The results indicate that contribution of macro-level variables effects is much higher than that of micro-level variables. The overall contribution of individual variables ranged from 1.1% to 23.1% in absolute value whereas that of macro-level variables was 31.3% and 32.3% for socio-economic development and provincial barriers to health care access respectively. This implies that both individual and provincial characteristics explained some of the provincial variation in use of health facility for delivery by adolescent women. However, provincial (community) characteristics were more important predictors of use of health facility for delivery by adolescent women than micro-level characteristics. Programme intervention aimed at encouraging adolescent women to use the health facility for delivery of their children should take into account the provincial characteristics as well.

11.1.3 PNC service utilisation

The level of PNC utilisation within 48 hours after delivery by women who gave their last birth as adolescents during the five years preceding the survey stood at 23.9%. This proportion is lower than those of women in general in Zimbabwe which is 27%. The level of PNC use varied significantly by province.

Micro-level variables associated with PNC utilisation included religion, level of media access and level of autonomy. With regard to religion, adolescent women affiliated to Traditional and Apostolic religion were significantly less likely to be PNC users as compared to those belonging to Protestants and Pentecostal religions. The odds of PNC utilisation increased with an increase in the level of autonomy. Adolescent women with high media access were more likely to be PNC users. Notably, this association between the high level of media access and PNC utilisation was moderated by the level of barriers to health care access at province level. This means that the increased likelihood of PNC service utilisation by adolescent women related to high media access changed as a function of the level of barriers to health care access in provinces where adolescent women reside. The implication is that if an adolescent woman with high media access resides in a province with a high levels of barriers to health care access, the odds of using PNC services will still be low. As mentioned earlier, access to media covered frequency of access to information through radio, television and either newspapers and magazines. Access to media has always been associated with increased use reproductive health care service utilisation (Cohen, 2000). Since barriers to health care access covered broader areas that included barriers such as getting permission,

affordability and transportation, policy strategies addressing the problems of utilising postnatal care should be multifaceted. Programme interventions should involve broader areas involving the community's traditional, cultural and religious norms, issues of women empowerment, economic growth and removal of barriers that hinder access to health care.

Results from the study revealed that community-level characteristics had an independent impact on PNC service utilisation by adolescent women. The provincial socio-economic development was significantly associated with use of PNC services. The odds of utilising PNC services within 48 hours after delivery of last child by adolescent women were higher in provinces with a high socio-economic development index. The provincial socio-economic development remained significant even after controlling for individual-level characteristics. Another community-level characteristic associated with PNC utilisation by adolescent women was the provincial barriers to health care access. As mentioned earlier, the impact of provincial barriers to health care access operated through level of media access. Provincial barriers to health care access therefore moderated the association between level of media access with PNC utilisation by adolescent women.

Analysis of this reproductive health care utilisation outcome aimed at comparing the contribution of the macro-level variable effect on PNC service utilisation by adolescent women with the contribution of micro-level variable effects. Using variables associated with PNC utilisation by adolescent women in the final model, it was possible to compute a change in the predicted probabilities when values of each variable changes whilst controlling for other variables under the final multilevel models. Results from the study demonstrated that the contribution of the provincial socio-economic development exceeds that of individual level variables. The contribution among individual-level variables associated with PNC use by adolescent women ranged from 1.2 to 10% whereas the contribution of a change of residence from a province with low socio-economic development to a province with a high socio-economic development would increase the probability of PNC utilisation by adolescent women by 17.1%. This means that province-level characteristics were more important predictors of PNC utilisation than individual-level characteristics. To improve PNC utilisation levels within 48 hours after delivery of child by adolescent women, it is imperative that provincial characteristics be considered when making reproductive health programme interventions by policy makers.

In conclusion, this study revealed that variation in utilisation of reproductive health care by adolescent women between provinces is partly ascribed to community or province-level characteristics. Community-level characteristics are more important predictors of use of health facility for delivery, and PNC utilisation than individual-level characteristics. However, individual-level characteristics are more important in determining modern contraceptive use among adolescent women than province-level (community) characteristics. The association between individual-level variables and reproductive health care utilisation was moderated by community-level variables. So, to increase reproductive health care utilisation among adolescent women, reproductive health intervention programmes need to take into account community (provincial) characteristics.

11.2 Frontiers for Further Research

Both the individual and community characteristics are important predictors of adolescent women's reproductive health care utilisation in Zimbabwe. However, findings indicate that community-level attributes were more important predictors of use of health facility for childbirth and use of PNC services than individual-level attributes, but that could not be said about use of modern contraceptives. There is still some more work to be done in order to conceptualise the effects of community characteristics on adolescent women's utilisation of reproductive healthcare. The strengths and limitations have implications for future research.

First, a study with a larger sample size for adolescent women is needed to examine the effects of community characteristics at various levels such as districts and EAs. Approximation of community-level covariates would be measured more accurately with a larger sample size at district level and EAs as larger sample sizes have less of an inference as compared to smaller samples. A smaller sample size affects the reliability of study results because they lead to higher variability, which may lead to bias. The sample size for adolescent women for this study was not large enough to make further analysis at district and EA levels. An increase in the number of cases for the ZDHS would also enable studying of various vulnerable groups of women at different levels of analysis. An increase in the number of observations at the macro level (level 2) to improve the accuracy of the estimates is also needed.

Second, this study is quantitative in nature and uses data from the 2010/11 ZDHS and as such has limitations in terms of scope. Future researchers should consider the mixed methods approach which has proved to be useful in explaining predictors of reproductive health care use. For example, there is need to explore contextual determinants beyond what this study has covered. Some aspects of reproductive health behaviours can only be explained by information gathered through qualitative approaches as they offer discernments that have often eluded statistical measurement (Kawachi & Berkman, 2003*).* Other contextual determinants that need to be examined include the influence of socio-cultural and political factors on utilisation of reproductive health care among adolescent women. Whilst quantities methods can provide measures on the levels of use of reproductive health care services, associations, independent effects and moderation of community level characteristics, qualitative research would gather qualitative information and identify mechanisms of neighbourhood effects on reproductive health care utilisation. Such qualitative approaches focussing on reproductive health care utilisation can analyse social processes and contexts through health issues relating to public health programmes and policies. The context of qualitative research may also cover other areas such as history, politics, cultural issues and local social disparities to all levels. Qualitative approaches are useful for impacting on reproductive health care programmes and public health policy as they are effective in communicating to policy makers in a convincing and clear manner (O'Campo, 2003; Vu, 2005). However, qualitative approaches are not necessarily adequate by themselves to effect change because they do not need a large sample size to be carried out. They are often restricted to observation of a relatively small number of individuals within a constrained location.

A combination of both methods incorporates both the need to explore and explain the determinants of reproductive health care utilisation by adolescent women. Putting together both perspectives would deliver resounding substantiation of how community variable effects operate to influence adolescent women's utilisation of reproductive health care services. The mixed method approach has its own advantages and disadvantages. Some of the challenges of combining both the quantitative and qualitative approaches in future researches include the administrative complexity and the high cost that accompanies the whole exercise of design, data gathering exercise and data manipulation.

Third, this study uses provinces as a unit of analysis for multilevel modelling. Provinces in Zimbabwe are however defined using political boundaries. Using political boundaries as

proxies for communities in multilevel modelling has its own limitations. Multilevel analysis assumes that people with similar characteristics and behaviour tend to cluster and live together and these may not necessarily be defined by political boundaries. It is thus essential to have appropriate boundaries corresponding to the self-defined communities of individual respondents because the social patterns of individuals do not often correspond with political boundaries such as provinces in Zimbabwe. Future research should therefore focus on identifying boundaries for neighbourhoods and characterising neighbourhood attributes.

There is unanimity in meaning by several theorists of neighbourhood that neighbourhoods are both physical and social spaces (Harding, 2003; Galster, 2001; Lupton & Power, 2002). Many studies that use quantitative methods tend to fail to reflect the complex conceptualisation of neighbourhoods. Just like this study, a majority of them use census-derived measures of neighbourhood socio-economic position (Mujahid et al., 2007). Diez Roux (2008) has suggested that partitioning variance for non-continuous variable health outcomes becomes complex as a result of communities or clusters that are generally grossly mis-specified. Other researchers have promoted the need to move beyond just neighbourhood so as to investigate other contexts as neighbourhoods may not be relevant perspectives for many relevant health outcomes (Mujahid et al., 2007; Moudon et al., 2007; Diez Roux, 2008). Such measurement of neighbourhood positioning using different aspects of context would improve the accuracy of community level covariates. It would also provide an improved platform for examining the moderating or mediating effects among neighbourhood variables and suggest potential aspects of neighbourhood which are appropriate targets for policy manipulation.

Fourth, because of the cross-sectional nature of the study, it is difficult to establish causal pathways between the community-level variables and reproductive health care service utilisation outcome. This is a great challenge not only for this study but for social scientific examining the relationships between neighbourhood effects and outcomes of interest (Diez Roux, 2004, Oakes, 2004, Furstenberg & Hughes, 1997, Jencks & Mayer, 1990). Generally, quantitative research has managed to demonstrate independent effects of neighbourhood effects on individual outcomes, but was not convincing in showing causation effect neighbourhoods using observational data (Jencks & Mayer, 1990). A new approach to determining the causation effects of neighbourhoods was suggested by Harding (2002). Harding (2002) uses a “counterfactual” model of causality which enables researchers to

demonstrate the meaningful and robust effects of neighbourhood context on individual outcomes. The framework uses propensity score matching estimators with statistical controls instead of the usual traditional regression estimators. Another approach to establish causal effects of neighbourhoods on reproductive health care utilisation would be the use of a longitudinal study in which adolescent women and neighbourhoods are followed over time. One of the assumptions that most social scientist have on such studies is that neighbourhood characteristics of interest do not change over time. Socio-economic development is a major priority for almost all developing countries and we cannot expect neighbourhoods to remain socio-economically disadvantaged for a long period of time. Such developments are believed to have significant influence on reproductive health care utilisation behaviour. Longitudinal study design has advantages of being able to document such developmental changes over time.

Lastly, research on determinants of PNC utilisation is very limited (Langlois et al., 2013). Most of the studies have dwelled much on other areas of reproductive health care utilisation such as use of ANC, contraception, and use of health facility for delivery. This is one of the few studies that have covered PNC utilisation and went further to investigate the effects of community-level variables on PNC use. Future research should cover PNC utilisation and examine other neighbourhood effects on PNC use.

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APPENDICES

Appendix 1: Principal Analytical Results for Provincial (Community-Level) Socio-Economic Development

Factor Analysis

Correlation Matrix						
		Provincial Proportion of Women with 2 or less children ever born (at most 2 CEB)	Provincial Proportion of Females with at Least Secondary Education	Provincial Proportion of Women who Delivered their Last Child in a Health Facility	Provincial Proportion of Women in Labour Force	Provincial Proportion of Women Living above Poverty Level
Correlation	Provincial Proportion of Women with 2 or less children ever born (at most 2 CEB)	1.000	0.934***	0.910***	0.182***	0.693***
	Provincial Proportion of Females with at Least Secondary Education	0.934***	1.000	0.795***	0.383***	0.847***
	Provincial Proportion of Women who Delivered their Last Child in a Health Facility	0.910***	0.795***	1.000	0.035***	0.478***
	Provincial Proportion of Women in Labour Force	0.182***	0.383***	0.035***	1.000	0.655***
	Provincial Proportion of Women Living above Poverty Level	0.693***	0.847***	0.478***	0.655***	1.000

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.718
Bartlett's Test of Sphericity	Approx. Chi-Square	60039.464
	df	10
	Sig.	.000

Communalities		
	Initial	Extraction
Provincial Proportion of Women with 2 or less children ever born (at most 2 CEB)	1.000	.977
Provincial Proportion of Females with at Least Secondary Education	1.000	.963
Provincial Proportion of Women who Deliverred their Last Child in a Health Facility	1.000	.917
Provincial Proportion of Women in Labour Force	1.000	.928
Provincial Proportion of Women Living above Poverty Level	1.000	.911

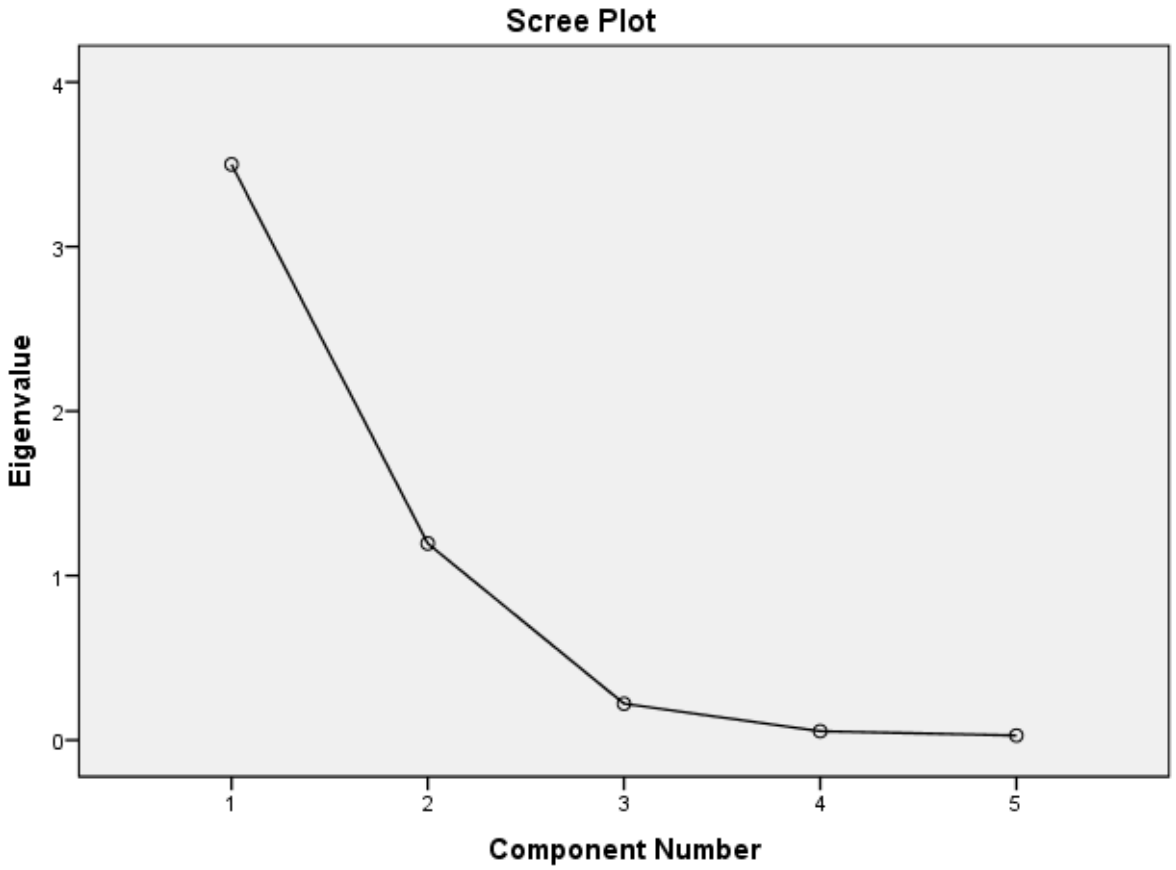
Extraction Method: Principal Component Analysis.

Total Variance Explained					
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings	
	Total	% of Variance	Cumulative %	Total	% of Variance
1	3.500	70.003	70.003	3.500	70.003
2	1.196	23.913	93.917	1.196	23.913
3	.221	4.430	98.347		
4	.054	1.083	99.430		
5	.029	.570	100.000		

Total Variance Explained		
Component	Extraction Sums of Squared Loadings	Rotation Sums of Squared Loadings
	Cumulative %	Total
1	70.003	3.272
2	93.917	1.939
3		
4		
5		

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.



Analysis weighted by Women's individual sample weight (6 decimals)

Component Matrix[a]		
	Component	
	1	2
Provincial Proportion of Women with 2 or less children ever born (at most 2 CEB)	.942	-.300
Provincial Proportion of Females with at Least Secondary Education	.980	-.047
Provincial Proportion of Women who Deliverred their Last Child in a Health Facility	.827	-.483
Provincial Proportion of Women in Labour Force	.458	.848
Provincial Proportion of Women Living above Poverty Level	.871	.390

Extraction Method: Principal Component Analysis.[a]
a. 2 components extracted.

Pattern Matrix[a]		
	Component	
	1	2
Provincial Proportion of Women with 2 or less children ever born (at most 2 CEB)	.985	.012
Provincial Proportion of Females with at Least Secondary Education	.868	.275
Provincial Proportion of Women who Deliverred their Last Child in a Health Facility	.995	-.206
Provincial Proportion of Women in Labour Force	-.109	.988
Provincial Proportion of Women Living above Poverty Level	.516	.671

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.[a]
a. Rotation converged in 6 iterations.

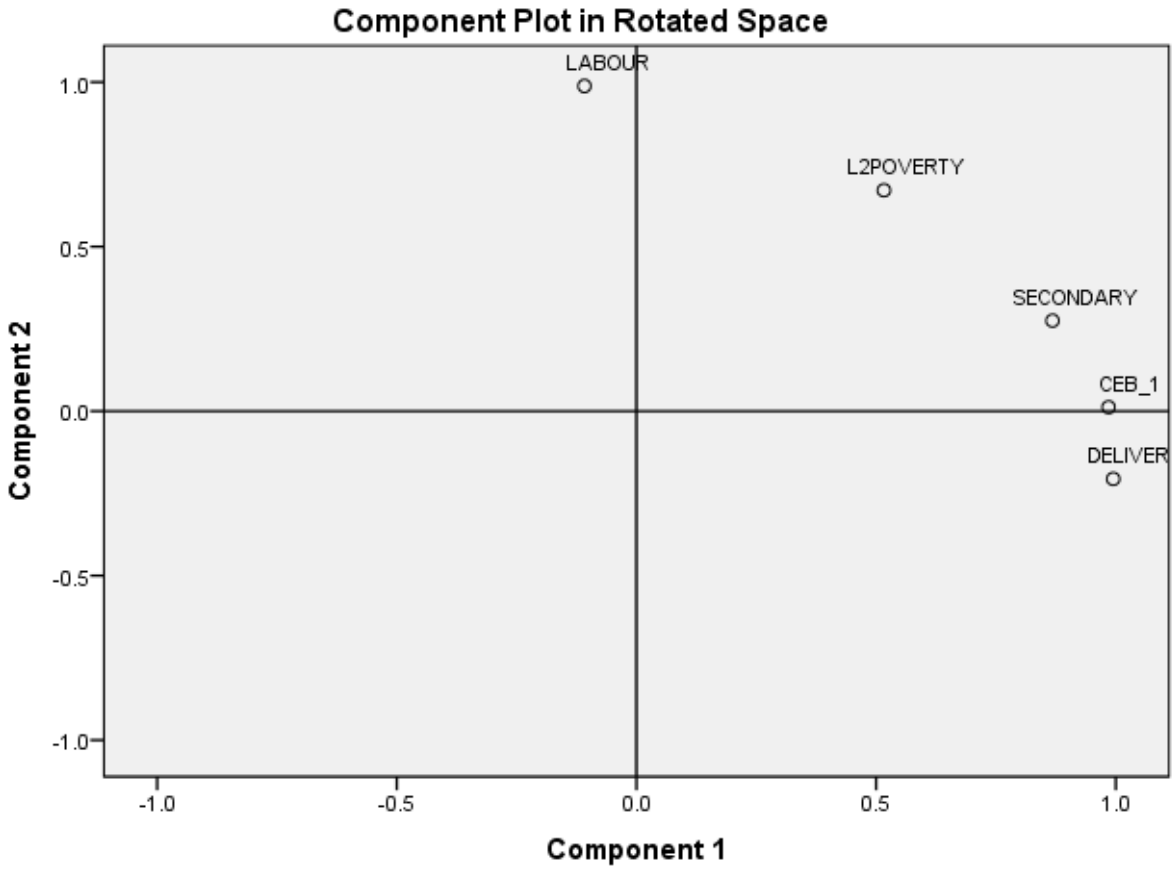
Structure Matrix		
	Component	
	1	2
Provincial Proportion of Women with 2 or less children ever born (at most 2 CEB)	.988	.288
Provincial Proportion of Females with at Least Secondary Education	.945	.518
Provincial Proportion of Women who Deliverred their Last Child in a Health Facility	.937	.072
Provincial Proportion of Women in Labour Force	.168	.958
Provincial Proportion of Women Living above Poverty Level	.704	.816

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2
1	1.000	.280
2	.280	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.



Analysis weighted by Women's individual sample weight (6 decimals)

Component Score Coefficient Matrix		
	Component	
	1	2
Provincial Proportion of Women with 2 or less children ever born (at most 2 CEB)	.334	-.054
Provincial Proportion of Females with at Least Secondary Education	.278	.127
Provincial Proportion of Women who Delivered their Last Child in a Health Facility	.351	-.198
Provincial Proportion of Women in Labour Force	-.099	.658
Provincial Proportion of Women Living above Poverty Level	.134	.410

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
Component Scores.

Component Score Covariance Matrix		
Component	1	2
1	1.078	.560
2	.560	1.078

Reliability

Scale: ALL VARIABLES

Case Processing Summary			
		N	%
Cases	Valid	9170.999890	100.0
	Excluded[a]	.000000	.0
	Total	9170.999890	100.0

Weighted by the variable Women's individual sample weight (6 decimals)
a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.902	4

ANNEXURES

Annexure 1: Policy Brief

For: Zimbabwe Ministry of Health and Child Care (ZMHCC)

United Nations Population Fund (UNFPA)

Zimbabwe National family Planning Council (ZNFPC)

Zimbabwe National Statistics Agency (ZIMSTAT)

Zimbabwe Ministry of Women's Affairs, gender and Community Development (ZMWAGCD)

By Enock Ngome

Improving Utilisation of Reproductive Health Care Services by Adolescent Women in Zimbabwe

The high rates of early childbearing in Zimbabwe has been one of the most significant hindrance towards improving maternal health as per the Sustainable Development Goal 3 (SDG 3). Despite the high maternal mortality rates, the use of reproductive health care services such as modem contraceptive use, use of health facility for delivery and postnatal care use by adolescent women remains very poor in Zimbabwe. As a country with the greatest need for an improvement in adolescent women's utilisation of reproductive health services and ultimate reduction of maternal mortality rates, Zimbabwe has prospects to improve the reproductive health of adolescent women.

In Zimbabwe, about a third of adolescent women in sexual union (35.4%) are estimated to currently using modern contraceptives. Close to two thirds (63.6%) of adolescent women who had their last child during the last five years used the health facility for delivery and slightly above a fifth (23.3%) used postnatal care services. To ensure optimal use of reproductive health care services by adolescent women in Zimbabwe, policy makers from the Ministry of Health and Child Welfare (MHCW) in Zimbabwe together with relevant stakeholders should

be equipped with relevant knowledge on individual and community characteristics that influence adolescent women's utilisation of reproductive health care services.

Critique

Research evidence has shown that the major cause of death among adolescent women aged 15 to 19 years in developing countries are pregnancy and childbirth (Mayor, 2004; UNFPA, 2004). To prevent early pregnancies, reproductive health care services such as use of modern contraceptives should be utilised. This will contribute significantly to the reduction of risky pregnancies and premature mortality. For adolescent women who are already pregnant, the use of reproductive health care services such as antenatal care (ANC), use of health facility for childbirth and postnatal care service use would reduce the associated morbidity and mortality for adolescent women and their infants (Babalola & Fatusi, 2009). Zimbabwe is not on track in achieving the MDG 5 of improving maternal health with adolescent women increasingly contributing to the maternal mortality ratio (ZIMSTAT & ICF International Inc., 2012). Whilst there are improvement in the use of ANC services by adolescent women, the same cannot be said on use of modern contraceptives, use of health facility for delivery and use of postnatal care services. Therefore, understanding factors influencing adolescent women's contraceptive use, use of health facility for delivery and postnatal care services becomes a significant public health need.

Policy decisions by the government of Zimbabwe through the Ministry of Health and Child Welfare critically affect utilisation of reproductive health care services. During the last decade, there have been several youth policies that have been developed to improve the sexual and reproductive health of adolescents in Zimbabwe. One of the policies include the National Adolescent Sexual and Reproductive Health Strategy, 2010-2015 (Ministry of Health and Child Welfare (MHCW), 2009) which incorporates three approaches; community based approach, health facility approach and school based approach. The community based approach uses youth centres which offers counselling, recreational activities and condom distribution. The health facility approach involves creating youth corners where voluntary counselling and HIV testing services are offered, and family planning services are provided including condom distribution. The school based system provides adolescents with life skills training and counselling. The operation of these programs falls under the Zimbabwe National Family Planning Council and it partners with the United Nations Population Fund (UNFPA)

to create youth friendly services in both behaviour change messaging and clinical care (Remez, Woog & Mhloyi, 2014).

The National Policy on HIV/IDS (Government of Zimbabwe, 1999) is another policy that addressed youth issues and it put much emphasis on ensuring that adolescent have access to condoms through various sectors of the community. In addition, the recent 2012 policy on Sexual and Reproductive Health by the MHCW committed itself to ensuring adequate access to reproductive health services by adolescents (Ministry of Health and Child Welfare (MHCW), 2012). The policy committed itself to clarify that adolescents younger than 18 years did not need parental consent to receive contraceptives and HIV services.

Despite these policies, there still insufficient knowledge on individual characteristics influencing reproductive health service by adolescent women. In addition, research has shown that community characteristics play an important role in reproductive health behaviour. With regard to modern contraceptive use, parity of one or more children was the most influential individual level characteristic influencing modern contraceptive use. Although provincial socio-economic development context had independent influence on modern contraceptive use, individual characteristics were more important. For use of health facility for delivery and postnatal care, the influence of provincial level characteristics was more important than individual level characteristics. Age at birth, birth order, level of education, religion, media access, household wealth and level of autonomy were individual characteristics associated with us of health facility for delivery. Provincial socio-economic development and provincial barriers to health care access had independent effects on use of health facility for delivery. Use of postnatal care was influenced by access to media, religion and level of autonomy at individual level whereas provincial socio-economic development also independently influenced use.

Recommendations

To improve adolescent women's utilisation of reproductive health services in Zimbabwe, policies aimed at improving utilisation should consider that provincial level characteristics were more critical predictors of use of health facility for delivery and postnatal care services by adolescent women. However, individual level characteristics were more important for use of modern contraceptives by adolescent women. In order to improve reproductive health utilisation, the following is recommended:

- **Encourage Adolescents to delay sexual debut until they are 20 years:** Adolescents need to be protected by encouraging them to delay getting into sexual unions or getting married. Emphasis should be placed on the importance of delaying childbearing by creating an understanding and support to reduce adolescent pregnancy by encouraging them to wait until they are 20 years before they could have a child. At individual level, encouraging adolescents to delay getting into sexual unions would reduce early childbearing given the traditional and cultural pressures adolescent women experience.
- **Encourage Adolescent Women in Sexual Union to Use Modern Contraceptives until they are 20 Years:** From a program delivery and policy making perspective, there should be more emphasis on encouraging adolescent women who are already in sexual union, to use modern contraceptive through provision of adequate information on resultant reproductive health outcomes of early childbearing.
- **A multifaceted approach to improving provincial socioeconomic development status will improve adolescent reproductive health utilization:** The government of Zimbabwe should develop a multifaceted approach to improving socio-economic development status of provinces through policy interventions that are aimed at increasing the likelihood of using the reproductive health services by adolescent women. This may include strategies that encourage use of health facility for delivery, attainment of secondary education for women, fertility reduction, women's labour participation and poverty reduction efforts across all provinces.
- **Address cultural norms and factors that hinder access to health care to improve adolescent reproductive health care use:** Intervention programs need to look at the aspects of provinces that may hinder access to health care such as cultural norms, physical accessibility and provision of transportation facilities to health facilities. The Ministry of Health and Child Welfare should work together with relevant stakeholders to ensure elimination of barriers to access to care. Since barriers to health care access covered broader areas that included barriers such as getting permission, affordability and transportation, policy strategies addressing the problems of utilising postnatal care should be multifaceted. Program interventions should involve broader areas involving the community's traditional, cultural and religious norms, issues of women empowerment, economic growth and removal of barriers that hinder access to health care.

- **Further research is need to inform program interventions:** Further research is needed to find pathways through which community characteristics influence adolescent women's utilization of reproductive healthcare.
- **For Further Reading:**

Babalola S. & Fatusi A. (2009). Determinants of Use of Maternal Health Service in Nigeria – Looking Beyond Individual and Household factors. BMC Pregnancy and Childbirth; 9: 43.

Government of Zimbabwe. (1999). National Policy on HIV/AIDS for the Republic of Zimbabwe. Harare. Government of Zimbabwe.

Mayor, S. (2004). Pregnancy and Childbirth are the Leading Cause of Death in Teenagers in Developing Countries. *BMJ*, 328(7449), 1152.

Ministry of Health and Child Welfare. (2009). The National Adolescent Sexual and Reproductive Health Strategy, 2010-2015. Harare, Zimbabwe: United Nations Population Fund (UNFPA), UNICEF and WHO.

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Remez, L., Woog, V. & Mhloyi, M. (2014). Sexual and reproductive health needs of adolescents in Zimbabwe, *In Brief*, New York: Guttmacher Institute, No. 3.

United Nations Population Funds (UNFPA). (2004). State of the World Population: Adolescents and Young People. New York. USA.

Zimbabwe National Statistics Agency (ZIMSTAT) and ICF International. (2012). *Zimbabwe demographic and health survey 2010-11*. Calverton, Maryland: ZIMSTAT and ICF International Inc;.

Annexure 2: Professional Proof-reader's Certification

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30 August 2015

To whom it may concern,

This letter serves to confirm that Enock Ngome's Doctorates of Philosophy (PhD) in Demography and Population Studies' Thesis has been proofread, and that necessary and required amendments have been made.

Sasha Frade
Proofreader / Copy-editor / Researcher

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