ASSOCIATION BETWEEN INJURIES AND OCCUPATIONAL EXPOSURES IN SOUTH AFRICA: AN EPIDEMIOLOGICAL STUDY AT THE POPULATION LEVEL.

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Johannesburg, December, 2010

DECLARATION

I, Mary Kanyua Kinoti declare that this research report is my own original work. It is being submitted for the degree of Masters of Science (Medicine) in Epidemiology and Biostatistics of the University of the Witwatersrand, Johannesburg.

It has not been submitted before in part or in full for any degree or examination at this or any other University

Signature: **Date:** December, 2010.

DEDICATION

This work is dedicated to my parents Mzee Stephenson G. Ringera and late Mama Zipporah K. Ringera (R.I.P).

Asante Sana Baba na Mama for laying a strong and unshakable foundation in my life.

APPROVAL

This research project was presented in part fulfilment of the requirements for the award of Master of Science (medicine) in Biostatistics and Epidemiology at the University of Witwatersrand with the approval of my Supervisor:

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ABSTRACT

Introduction: Work - related injuries are of major public health importance because they have severe negative economic and social impacts to individuals, families, and a country's economy as a whole. South Africa is a rapidly expanding economy and so there is great potential for work-related injuries. Notably, a number of studies on work-related injuries in South Africa and globally are done at the industry level. While no effort to minimise occupational injuries at the enterprise level should be spared, more information is also required on the morbidity burden of these work-related injuries at the general population level. It was therefore against this background, that this research project was carried out.

Objective: The objective of this study was to determine the association between injuries and occupations among workers aged 15 - 65 years.

Methods: The dataset for this dissertation was extracted from the South African 2001 Labour Force Survey. Only respondents who reported having worked in the previous twelve months were included in the study sample (n=21,751). The outcome variable was injury over the previous twelve months. The explanatory variables were socio-demographic, occupation, and occupationally related characteristics. Logistic regression controlling for the socio-demographic characteristics was used to identify occupational and occupationally related predictors for incidence of injury at 95% confidence level.

Results: Injury incidence of 4% (894/ 21751) was reported which was mainly associated with age, gender, ethnicity and province of residence at $p<0.05$. Male workers were more likely to sustain accidents than female workers with a risk ratio of male/female of 2.4 times. Unexpectedly, injuries increased with age. In respect to ethnicity, the Coloureds, Indian/Asians and Whites were 18%, 48% and 44% less likely to sustain injuries respectively compared to the

African blacks while workers in the group called “Other” were 5.3 times at risk than African blacks.

Adjusted analyses indicated that, workers in mining and quarrying (AOR=2.2), crafts and related trade (AOR=4.0), plant and machine operators (AOR=4.4) and elementary occupations (AOR=2.7) were predisposed to a higher risk of sustaining injury than other occupations. Surprisingly, permanent workers, those with written contract, pension contribution were found to have a higher likelihood of sustaining injuries than their counterparts.

Conclusions: The incidence of injury to workers in South Africa was found to be at 4%. The older, male, and permanently employed workers were at a greater risk of sustaining injuries compared to young, female and casual workers respectively.

In regards to occupations, mining and quarrying, crafts and related trade and elementary occupations elevated the risk of sustaining injuries than other occupations. It is highly recommended that occupation-specific programmes be instituted to minimise worker injuries particularly among the high risk work places.

Further research is also required to investigate findings that were found to be inconsistent with existing literature namely; increase of injuries with increase in age, and why workers on permanent versus casual employment were more likely to sustain injuries.

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TABLE OF CONTENT **PAGE NO.**

Page

LIST OF FIGURES

LIST OF TABLES **Page**

GLOSSARY OF KEY TERMINOLOGIES)

Terminology:	Definition
Age:	Age of the study participant by February 2001.
Bivariate analysis:	Cross tabulation between the outcome injury and the independent variables to test association
Economic activity:	Any activity that was a source of livelihood including owning business, domestic work, farm work, construction work, catching food(fish, prawns shells, wild animals), and begging money for food.
Ethnicity:	Describes the racial classification of a particular group in South Africa (African Black, Coloured, Indian/Asian White and Other). The option "Other race" were respondents who declined to self- classify as African Black, Coloured, Indian/Asian or White).
Elementary Occupations:	street vendors, and other street services, domestic and other office helpers, building care-takers, potters watch persons garbage collectors.
Formal sector: -	All businesses that are registered in any way by the government.
Informal Sector: -	All businesses that are not registered in any way by the government.
Injury incidence: -	Number of injuries sustained by a worker while doing an economic activity. Calculated from responses to the question "Has in the past 12 months been injured while doing any of the economic activities mentioned earlier?"[Q424_injury in the questionnaire {Appendix 6.1)].
Kurtosis: -	A measure of the data's flatness. The Kurtosis of a "Normal" distribution is 3. Kurtosis values greater than 3 indicate that the distribution is peaked relative to the normal. If the Kurtosis is less than three the distribution is flatter than the ideal normal curve.
Main Industry:-	This sector comprised the following sub-sectors; Mining and quarrying, manufacturing, electricity water and energy, construction, wholesale and retail trade , transport and communications, finance insurance and business service, Community and personal services, Private households, agriculture, hunting, forestry and fishing and other.

Main Occupation: This sector comprised the following categories of workers: Legislators, senior officials and managers; professionals; technical and associate professionals; clerks; service workers, shop and sales workers; skilled agriculture and fishery workers; crafts and related trade workers; plant and machine operators and assemblers; elementary occupation and domestic workers.

Multivariate Analysis: Logistic regression analysis of association between an outcome variable and several independent variables and /or controlling for confounders.

Occupational Injury: Any injury while doing an economic activity or/and occupation

'**Other' Ethnic group**: This group comprised individuals not willing to reveal their ethnicity.

PSU: Primary Sampling Unit. In this study the PSU was a household.

Univariate Analysis: Logistic regression analysis of association between an outcome variable (injury) and one independent variable at a time

Worker: Any household member aged between 15 and 65 years by February 2001 and was involved in any economic activity or activities to earn a living.

Skweness: A measure of the data's symmetry. If a distribution is "Normal" skewness will equal 0 (zero). Positive skewness where mean is more than the median and negative skewness where the mean is less than the median.

Stata: An Integrated statistical package for data analysis, management and graphics a product of Stata Corp, USA.

LIST OF ABBREVIATIONS

AORS	-	Adjusted Odds Ratios
ASCCI	-	American Standard Code for Information Interchange
CAs	-	Care Aids
CI	-	Confidence Interval
CORs	-	Crude Odds Ratios
DHS	-	Demographic and Health Survey
EA	-	Enumeration Area
ILO	-	International Labour Organization
LFS	-	Labour Force Survey
NHLS	-	National Health Laboratory Services
NIOH	-	National Institute for Occupational Health
PSUs	-	Primary Sampling Units
R	-	South African Rand
R.I.P	-	Rest in Peace
RNs	-	Registered Nurses
SADC		South African Development Cooperation
US	-	United States
US$	-	US Dollars
USA	-	United States of America
WHO		World Health Organization
$\mathbf{X^2}$	-	Chi-Square
£	-	Sterling Pound

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND INFORMATION

Injuries to workers are an important public health problem that affects not only the person sustaining the injury but also the other household members dependent on the injured worker for support. Cumulatively, injuries on workers adversely affect productivity and income earnings even at the national level.

On the one hand, the International Labour Organization (ILO) estimated in 2002 that, among the world's 2.7 billion workers, at least 2 million deaths are attributable to occupational diseases and injuries which was an underestimation because data was not available for most countries (1).

And on the other hand, global estimates by the World Health Organization indicate that, about 120 million occupational accidents with 200 000 fatalities occur annually (2). These global figures concur with the estimates of 1997(3).

The 1997 report estimated that, the cost of occupational diseases and injuries globally was enormous with economic losses of about 4% of the world's gross national product. In the same report in US and Britain, the cost of occupational diseases and injury was estimated to be US$171 000 million in 1992 and between £6 000 - £12 000 million in Britain in 1994 (3). In the Southern African region the reported annual injury rates for wage workers ranged from 0.35 to 49.42 injuries per 1000 workers (4). Another report by the World Health Organization estimated the cost of occupational accidents and disease for 1996 and 2003 to be R17 billion and R30 billion respectively (5).

1.2 STATEMENT OF THE PROBLEM

In 1997, SADC Employment and Labour Annual Meeting noted that between 1990 and 1995, employment in the region was 5, 200,000 (6). The report indicated that injury rate per 1000 workers was 49.42 and 89 in the mining and construction industry respectively (6).

In 2003, it was reported that the injured and sick workers are usually returned to the homelands with minimal (if any) compensation and the cost to the workers and their families due to permanent disabling injuries and loss of employment particularly for those in rural areas was enormous (7).

It is further documented that, about 792,000 workers consult health services at least once a year due to disease or injury related to or aggravated by their work (8).

Therefore, the focus of this research was to determine which economic activities and/or occupations were associated with injuries at the general population level.

1.3 JUSTIFICATION OF THE STUDY

South Africa is a rapidly industrializing country and so prone to increased rates of occupational injuries and other work related problems as already been alluded to (3, 5, 6and 8). Notably, a number of studies on issues of occupational health and safety in South Africa and globally are mainly at the industry level. While no effort to minimise occupational injuries at the enterprise level should be spared, more information is required on the morbidity burden of these work-related injuries at the general population level. Firstly, this is important for South Africa to estimate injuries at the population level following the argument contained in The National Occupational Health and Safety Policy of 2003 on what happens when the workers get injured (7).

Secondly, such information is critical in planning for occupational health services to deal with the problem as there would be overall cost to society through increased use of medical and welfare services (2).

Thirdly, the study is an attempt to fulfil the need for comprehensive assessment of occupational injuries and societal cost at the general population as the World Health Organization states that, "*the lack of reliable health statistics has made it difficult to assess societal impact from work injuries or to compare the South African situation with other settings. Furthermore, there is need to incorporate non-fatal outcomes in the measure of the injury burden: – for each death there are several survivors with permanent disabling sequelae. This is a challenge given the weak information base for disability for most conditions*" (5).

Therefore, it was important to know what proportion of injuries among workers was attributable to work at the general population level in South Africa.

The South African Labour Department has been carrying out biannual labour force Surveys for several years now. The instrument used to collect employment details in February 2001 has an additional section on injuries for the respondents who worked for twelve months before the study. However, data so collected was not further analysed (10). As such, this study focused on completing the picture by analysing the section on injuries in an effort to determine the association of injuries and occupations.

Lastly, but equally important is that, data on work-related injuries in non-mining and informal sectors particularly at the general population level in South Africa is scanty for a country that has such a rapidly expanding economy. Therefore, this study will contribute to the knowledge of injury burden from occupations at the general population level in South Africa, an area that has scarce information.

1.4 RESEARCH QUESTION

Is there an association between injuries and occupations at the general population level in South Africa?

1.5 RESEARCH HYPOTHESIS

The null hypothesis that was being tested in this study was that, there was no association between injuries among workers and occupations in South Africa at 95% confidence level.

While the alternative hypothesis stated that, there was an association between injuries among workers and occupations in South Africa at 95% confidence level.

1.6 STUDY OBJECTIVES

The main objective of this study was to assess the association between injuries and occupations at the general population level in South Africa using the Labour Force Survey of February, 2001.

The specific objectives were to:-

a) To describe the study population by socio-demographic and occupational characteristics;
b) To describe the distribution of incidence of injuries, by socio-demographic and occupational characteristics; and
c) To determine the magnitude and direction of associations between incidence of injury and occupational characteristics while controlling for confounders such as socio - demographic characteristics.

1.7 STUDY AREA

The data that was used in this study was collected in 2001 from 20% of South African households that were randomly selected and representative of the South African population (10).

CHAPTER 2: LITERATURE REVIEW

Information from the World Health Organization on global burden of work related mortality from injuries indicates that there is an annual fatality of 200,000 from 120 million accidents worldwide (2).The World Health Organization and the International Labour Organisations have ably articulated on the health risks and cost due to occupational injuries globally (1, 2,3). Work-related morbidity and mortality not only results in suffering and hardship for the worker and his family, but also adds to the overall cost to society through lost in productivity and increased use of medical and welfare services (7).

Some of the work – related risk factors to injury are employment category, age, gender and levels of education and type of occupations (Table 2.1). Studies show that age injury incidence decrease with age as older workers have more experience and males are at higher risks than females (17, 18, and 22).

A study to investigate work-related needle stick injuries among in health facilities show that the rates differed by employment category(part-time, full-time and casual), and department of engagement(11, 12, 13). The rates of injury registered nurses in acute care and care aides in long-term facilities was 253, 229 and 181 per 1000 persons for part-time, full-time and casuals respectively(11). Among the Korean nurses needle stick injuries in other departments were 5.6 times more than those in intensive care units (12) In Bloemfontein, South Africa, gynaecologist, and orthopaedic surgeons were reported to sustain the highest number of injuries compared with other workers. (13).

Worker injuries were also found to be common in other industries such as glass manufacturing, fish processing, farming and steel industries (14, 15, and 16). For example, in India, a study among workers in the glass manufacturing industry showed injury incidence of 1105.1 per a thousand workers with working environment, machinery and lack of protective clothing being the major causes of injury (14). Injuries among women workers in the fish processing industry,

reported association of injury rates with type of work and statistically significant differences were observed between blanching, cleaning and packaging (15). Farm workers do also sustain work- related injuries. A study by Lesley (2008) among farm workers found out that machinery and falls caused 26% and 19% of injuries to workers respectively (16). Occurrence of injuries among steel workers in Brazil reported to decrease with the number of years in employment (17).

Notwithstanding studies at the industry level, there is a need to determine morbidity burden due to injuries and associated occupations at the general population level.

Selected studies that have been carried out elsewhere to estimate the burden of occupational injury morbidity at population level and associated risk factors are tabulated in table

Table 2.1: Selected Studies on Occurrence and Risk Factors to work-related Injuries.

Study Ref No.	Authors and year	Country	Type of Industry	Aim	Results
11	Hasanat, A *et al* (2007)	Japan	Health care facility	To investigate whether work-related injury rates differ by employment category (part-time, full-time or casual) for registered nurses (RNs) in acute care and care aids (CAs) in long term facilities	After adjusting for age, gender, facility and health region, full time RNs and CAs had a higher risk of sustaining injury than part-timers and casuals.
12.	Smith, D *et al* (2006)	Korea	Health Care Facility	To determine rates of Needle stick injuries among professional nurses.	Incidence of needle stick injuries was 79.7 among 263 nurses interviewed which translated to 1.3 injuries /nurse/year. Nurses working in other departments were 5.4 times likely to suffer a needle stick injury and 4.7 times more likely to incur a syringe needle stick than those in intensive care units
13.	De Villers, H.C, *et al* (2007)	South Africa	Health care	To determine the extent and outcome of occupational exposure to blood borne viruses among medical practitioners.	54% of the respondents had been exposed to blood borne viruses. 92% and 73.7% of obstetricians /gynaecologists and orthopaedic surgeons incurred injuries
14	Bazroy, J.; *et al* (2003)	India	Glass manufacturing	To determine the magnitude, pattern and risk factors for injuries in the glass bottle manufacture plant	Injury incidence was 1105.1/1000workers per year. Risk factors included the environment (38.8%) machinery (14.6%) and lack of protective clothing (44.8%)

Table 2.1 Cont'd					
study Ref. No.	**Author and year**	**Country**	**Type of Industry**	**Aim**	**Results**
15	Asim S et al, 2006	India	Fish processing	To determine the frequency of occupational injury occurrence and the associated factors in the fish processing industries	Injuries incidence of 1105.5 per 1000 workers with hand and wrist injuries at 40.6% and 30% respectively
16	Day L.,et al2008	Australia	Farming	To identify risk factors for serious farm related injury among men	26% and 19% were caused by machinery and falls respectively.
17	Shoemaker, MJ,etal, 2000.	Brazil	Steel	investigate risk factors for non-fatal workplace injury among men	Rate of work place injury was 5.6 per a 100 person years decreased with number of years in employment.
18	Gordon, S, et al, 2005	USA	Population level	To assess injuries and associated risk factors among non-institutionalised civilian populations	Incidence was 117 per 1000 workers and varied by gender, age, and ethnicity.
19	Pung, D.T., et al,2004	Vietnam	Population based	To characterise the patterns of reported work- related injuries	Annual incidence rate 7.06 per 1000, 26% higher among self-employed workers compared to formally employed.
20	South African government, 1998	South Africa	DHS Population Level	To collect health data at community level	Urban area residents were more prone to unintentional accidents compared to rural areas and men to women injury risk ratio was 2.3:1
21	Moshiro, C., et al, 2005	Tanzania	Population Level	To examine the pattern of non-fatal injuries and associated factors in urban and rural setting.	Annual incidence rate of 32.7 per 1,000 persons, males were at a higher risk of having injuries compared to males. in urban areas injuries were mainly caused by transport while farming was the main cause in rural areas.
22	Breslin, FC., et al.,2005	Canada	Population level	To examine age related differences in work injuries	Adolescent and young males females showed elevated risk to injuries compared to older workers with job characteristics controlled.
23	Breslin FC, et al., 2006	Canada	Population level	identify risk factors of work injuries among adolescents and young adults; to examine provincial differences	Ther were proncial differences in injury rates
24	Li, C.Y. et al, 1999	Taiwan	Population level	To explore factors associated with risk of sustaining multiple non-fatal injuries in the workplace.	Occupations with elevated risk to injury were mining and quarrying (OR=2.7), manufacturing (OR=1.2), commerce (OR=1.6), Transport and Communication (OR=1.3) and Social, Personal and Community (OR=1.4).

Among the cited studies, the US study assessment of burden of work-related injuries and associated risk factors among non- institutionalised civilian population found 117 episodes of injuries per 1000 persons occurred at work and varied by gender, age, and race/ethnicity (18). In this study Gordon et al (2005) found out that injury rates decreased with age and for gender, men were 40% more at risk of sustaining injuries than women. And higher rates were reported among non-Hispanic whites(4.7%), followed by non –Hispanic black adults at 4.0%(18).

A Vietnam study of 2004 sought to characterise the patterns of work-related injuries and reported an annual incidence rate of 7.06 per 1,000 persons with mechanical work being a major cause (19). It further reports that, occupational injuries were higher (26%) among self- employed workers than among formally employed ones.

Though injuries were not disaggregated into work related and non work-related, the South African Demographic and Health Survey of 1998, reported that, unintentional injuries rates per 100, 000 persons were occurring more often in urban than in rural areas (20). It further reported that, men to women injury risk ratio was about 2.3:1, and the leading provinces in injury rates per 100,000 persons were Gauteng with 3363.3, followed by Western Cape with 3214 cases and Mpumalanga with 1,710 cases annually. The province with the lowest injury rate was Free State at 985.8per year. It is further documented that, the prevalence of occupational morbidity in South Africa was estimated at about 8% (8).

In Tanzania, prevalence of injuries, though not segregated into occupational and non-occupational, was estimated 32.7 per 1,000 persons , mean age of the injured was 27.6 years while being a male was the only significant factor to major injuries(21). Similar to the South African Demographic Survey of 1998, more injuries occurred in urban areas in Tanzania.

Risk factors identified at the population level were similar to similar to those identified at the industry level.

As alluded by Li et al and others, there is evidence that incidence of injury varied with gender, age and ethnicity (18, 23, and 24) and type of occupation (25). According to Breslin (2005) Young workers were at higher risk of sustaining injuries than the older ones (23). In 2006, the

same author noted that place of residence influences chances of sustaining among workers(24). He noted that Saskatchewan youth were at twice the risk of being injured compared to Ontario Youth.

The Li's study showed that several occupations in Taiwan elevated the risk to injury among workers. Compared to construction industry, mining and quarrying manufacturing commerce Transport and Communication and Social, Personal and Community services had higher likelihood of worker sustaining injury at OR=2.7, OR=1.2, OR=1.6, OR=1.3 and OR=1.4.

Hence, the question in this study was: Are injuries associated with occupations at the population level? The study recognizes that workplace based studies are indispensable in assessing burden of occupational injuries among employees and are necessary in formulating injury prevention strategies to address both the worker and the work environment risk factors. Besides collecting information on injuries among workers in the formal employment it also gathered information on informal economic activities that members of a community undertake to earn a living. This inclusion of informal injury makes the estimates comprehensive and all inclusive than previously done in South Africa.

CHAPTER 3: METHODOLOGY

This chapter contains a brief description of the study design of the South African Labour Force Survey of February, 2001and that of this research project.

3.1 DESCRIPTION OF THE LABOUR FORCE SURVEY OF 2001

The South African Labour Force Survey done in 2001 was a cross-sectional survey of representative sample of 20% of South African households (10). Besides collecting socio-demographic and economic data, the interviewers administered questionnaires inquiring on occurrence and number of injuries among respondents who had worked in the previous twelve months. The survey also inquired if one sought medical care after injury and if the injury resulted in permanent disability.

A sample of 30 000 dwelling units was drawn from 3000 Primary Sampling Units (PSUs) (that is 10 dwelling units per enumerator area (EA)) from the Master Sample of 1996 census. A two-stage sampling procedure was applied and the sample was stratified, clustered and selected to meet the requirements of probability sampling. The Master Sample was based on the 1996 Population Census enumerator areas and the estimated number of dwelling units from the 1996 Population Census. The EAs were grouped within a province by urban/rural, and a proportional sample of EAs was taken from each group (stratum).

Because of item and unit non-response, standard errors of estimates were increased and estimations sometimes become biased. The two main methods for adjustment for non-response were imputation and re-weighting. Because of multistage sampling in the case of LFS sample, adjustment-cell weighting was applied.

The country was divided into nine strata (using the provinces as strata). Each strata was further divided into urban (code = 1) and rural (code = 2).

Response rate was calculated as the ratio of response to the sum of response and refusals. Codes were used as a measure of response, refusal, and out of scope.

Part of the questionnaire used in the Labour Force Surveys collected information on whether one has had an injury over the last 12 months if so, how many times and was it during an economic activity? It also collected information on main occupations and industries of employment and other work related characteristics such formal/informal, job-categories (permanent, contract, casual), and pension contribution, and income (in Rand) per month.

In view of the existing data, this study attempted to determine associations between injuries and occupations.

3.2 ABOUT THIS RESEARCH PROJECT

3.2.1 Study Design

The study design of this research project was a cross-sectional analytical one that used secondary data from the national-wide labour force survey conducted by the South Africa's Department of Labour in February, 2001.

3.2.2 Study Population

The study population comprised only those respondents aged between 15 - 65 years and were involved in one economic activity or another for twelve months before the study was conducted in February, 2001. Also, only those who had worked for 50 years or less were considered in this study up to and including February 2001.

3.2.3 Inclusion / Exclusion criteria

Figure 3.1 depicts the process of obtaining the study population among those respondents aged 15 - 65 years. Exactly, 5,018 of 72,921(7%) respondents were lost through cleaning and editing of data where either the outcome or independent variables had non-response or inapplicable responses. About 68% (46,152 out of 67,903) were excluded from analysis since they had not worked in the twelve months preceding the study.

Therefore, only 21,751 out 72,921 (30%) of the respondents were included in the study (Fig.3.1).

3.2.4 Sample Size

The dataset for this study was extracted from the South African Labour Force Survey of 2001. In the process of cleaning and editing before analysis, only 21,751 out of 72,921 (29.8 %) total respondents met the inclusion criteria for this study. Figure 3.1 shows the steps in acquiring a study population that met the inclusion criteria.

The magnitude of data loss through the outlined process of cleaning and editing reduced the data set of this study to a mere 30% of the original Labour Force Survey sample. Further examination of the magnitude of the said loss revealed that, the loss by strata (provinces) was disproportionate (Table 3.1). In view of this disproportionate loss, analysis was survey set to ensure appropriate weighting.

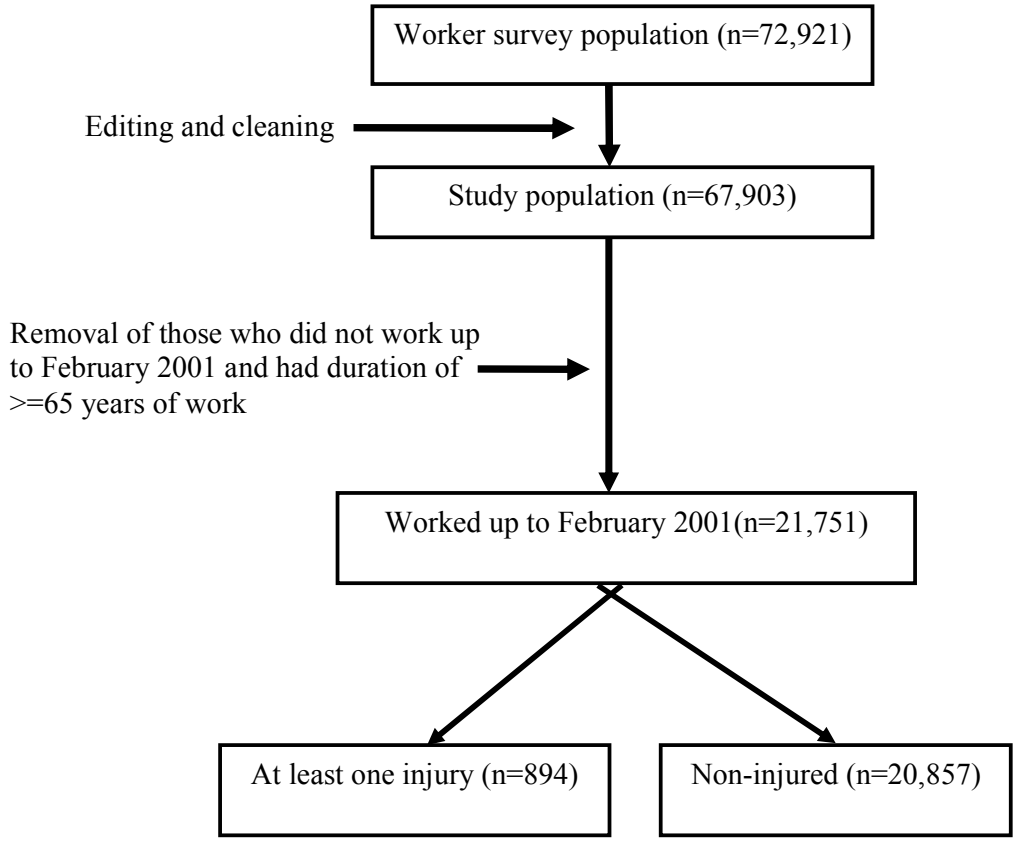

Figure 3.1: Process of acquiring a study population that met the inclusion criteria

Table 3.1: Percentage Distribution of Loss of Respondents by Province after Editing of the Labour Force Survey of February, 2001

Strata (Province)	LFS Worker Sample	Respondents in this Study	Percentage Loss
Western Cape	**7,736**	**3,463**	55.2%
Eastern Cape	**9,629**	**1,963**	79.6%
Northern Cape	**3,409**	**1,194**	65.0%
Free State	**6,026**	**2,030**	66.3%
KwaZulu Natal	**12,959**	**3,315**	74.4%
North West	**7,300**	**2,083**	71.5%
Gauteng	**11,194**	**4,216**	62.3%
Mpumalanga	**6,529**	**1,778**	72.7%
Limpopo	**8,140**	**1,709**	78.0%
Total	72,922	21,751	70%

NB. More information on the sampling of the Labour Force Survey is available at Statistics South Africa. Labour Force Survey, Statistical Release (P0210). February 2001. <www.statssa.gov.za>

3.2.5 Variables

(a) Dependent/outcome variable

The outcome variable was at least one occupational injury occurrence in previous twelve months.

(b) Independent/explanatory variable

These included:-

Socio-demographic characteristics (age, gender, marital status, ethnicity, province of residence, urban/rural residence and monthly income);

i Occupational characteristics (economic activities, main industries, main occupations);

ii Other occupationally-related characteristics included were tenure of employment (written contract, supervised work, pension contribution and paid leave), type of employment (permanent, fixed contract, temporary, casual, seasonal) and duration of work; and

iii Variables considered as confounders were socio-demographic characteristics (age, gender, ethnicity and province of residence**).**

3.2.6 Scope and Limitations

a) The analysis was restricted to the literature-identified variables in the dataset and other secondary factors derived from those in the same data set;

b) The outcome variables were retrospective measures of injury occurrence in the last twelve months. It would not be so obvious to recall occurrence of injuries particularly if they were minor. Therefore, such a study can result in underestimation or over estimation of the outcome variable (injury incidence) through recall bias;

c) Since interviews took place at home, it was possible that home injuries were better recalled than work related injuries. As such the injuries reported in this study are not necessarily occupationally - related;

d) One respondent per household was answering for all the other working household members. This is likely to introduce recall bias and knowledge limitations on the part of the respondents as regards other household members sustaining injuries. This can lead to gross under-estimation of injury occurrence;

e) Out of 72, 922 observations only 21,751(30%) respondents met the criteria for this study. Most (68%) of the respondents did not meet the inclusion criteria because they did not work in the previous twelve months before the study. This might have affected the representative- ness of the sample or led to selection bias and errors.

f) Case definition of the outcome variable injury is ambiguous. Work related injury can be physical, mental, pathological (disease) or even psychological. As such, individual responses depended on the understanding of the respondents on the term injury.

3.3 ETHICAL CONSIDERATION

The study used anonymous secondary data collected by the Department of Labour, South Africa during the 2001 Labour Force Survey. Therefore, no confidential issues of concern were

involved. The protocol also passed through the University of Witwatersrand, Human Research Ethics Committee to ensure that no ethical violations were inherent in this study. A copy of the ethical clearance certificate number M081043 of the research is hereby attached (Appendix 6.2).

3.4 DATA PROCESSING AND ANALYSIS

3.4.1 Data Processing

The primary data collected by the Department of Labour was in Rich Text File **(ASCII)** and was exported to Stata Version 10 for analysis. The relevant sections of this text file dealing with variables of interest were extracted from the worker and house files using the Meta data codes supplied by the Statistics South Africa. The variables were joined via the unique numbers to form the worker data set that was subsequently used in the analyses. The variables extracted are as outlined in section 3.8. Additional variables were generated to make analysis and interpretation of the results more meaningful. These additional variables included age groups, working duration and income categories. An extract of the questionnaire with the variables used in this study is attached (Appendix 6.1).

3.4.2 Survey Setting of the Data

After coding and describing the variables, the data was survey set to accommodate the cluster and strata weighting which was used in the Labour Force Survey (LFS) of February, 2001. The "*svyset"* Stata command organises data and gives outputs in weighted proportions as opposed to output of unweighted data. For example, tabulation of age group without "*svy"* command gives an unweighted output with frequencies, percentages and cumulative frequencies and that one of "svy" set data returns outputs in proportions out of 10.

3.4.3 Data Analysis

Codebook, describe and summarise were the Stata commands used to inspect the data. All the analyses utilised the prefix survey (svy) Stata commands to take care of the sampling design effect of strata and Primary Sampling Units (PSUs).

Analysis was done at three levels in reference to the objectives:-

* The first level was the description of the study population by socio-demographic and occupational characteristics;
* The second level investigated the association between the outcome (injury incidence) and explanatory (socio-demographic and occupational) characteristics using Design-based Chi Square Test obtained by use of the prefix, *svy*. Design-Based X^2 P-values were used to determine whether there was any statistically significant association between outcome and explanatory variables; and
* The third level of analysis was to determine the direction and magnitude of the association between outcome and explanatory variables using logistic regression modelling for survey data while controlling for socio-demographic (age, gender, ethnicity and province of residence) variables. These socio-demographic characteristics were controlled for in the logistic regression modelling because they were found to be statistically associated with injuries and as such were deemed confounders in this analysis.

  Use of logistic regression was appropriate as the outcome (dependent) variable (injury occurrence) was categorical. It was coded 1/0 where, 1 indicated event success (injury) and 0 indicated event failure (no injury). The logistic regression analysis in Stata Version 10 reports odds ratios. Both the Crude Odds Ratios (CORs) and Adjusted Odds Ratios (AORs) were presented and discussed.

  First, the Crude Odds Ratios (CORs) were determined for each of the socio-demographic and occupations characteristics. To control for confounding effect, the socio-demographic characteristics (age, gender, race, and Province of residence) were included in the logistic regression models for each of the occupational and related characteristics to obtain Adjusted Odds Ratio (AORs).

  Results from crude and adjusted logistic regression analyses were presented in the subsequent tables. The tables were extensively used to discuss the association between the explanatory variables and injury occurrence by examining both the CORs and AORs

CHAPTER 4: RESULTS

This chapter presents results to meet the three specific objectives outlined in section 1.6 namely:-

1) To describe the study population by socio-demographic and occupations characteristics;

2) To describe the distribution of incidence of injuries, by socio-demographic and occupational characteristics; and

3) To determine the magnitude and direction of associations between incidence of injury and occupational characteristics while controlling for socio-demographic characteristics.

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4.1 CHARACTERISTICS OF THE STUDY POPULATION

This section presents the description of the study population in terms of socio-demographic and occupational characteristics.

4.1.1 Age

The study group comprised a young population with about 64.0% (13534/ 21751) at 40 years of age and below. The overall mean age of the workers was 37.2 years, ranging from 15 to 65 years with a confidence interval of 36.7 to 37.8 years. The highest percentage (34.1%) of the study population was in the 31-40 years age group. Probably it because of the way the sample was selected and a substantial loss of older workers due to editing.

The box plot (Figure 4.1) and the histogram (Fig. 4.2) show that the study population was normally distributed in respect to age. The skewness and kurtosis of a normally distributed variable is 0 and 3 respectively. The age statistics shown in figure 4.2 reveal that there was a positive skewness of 0.32 and a kurtosis of 2.38 which indicated normal distribution.

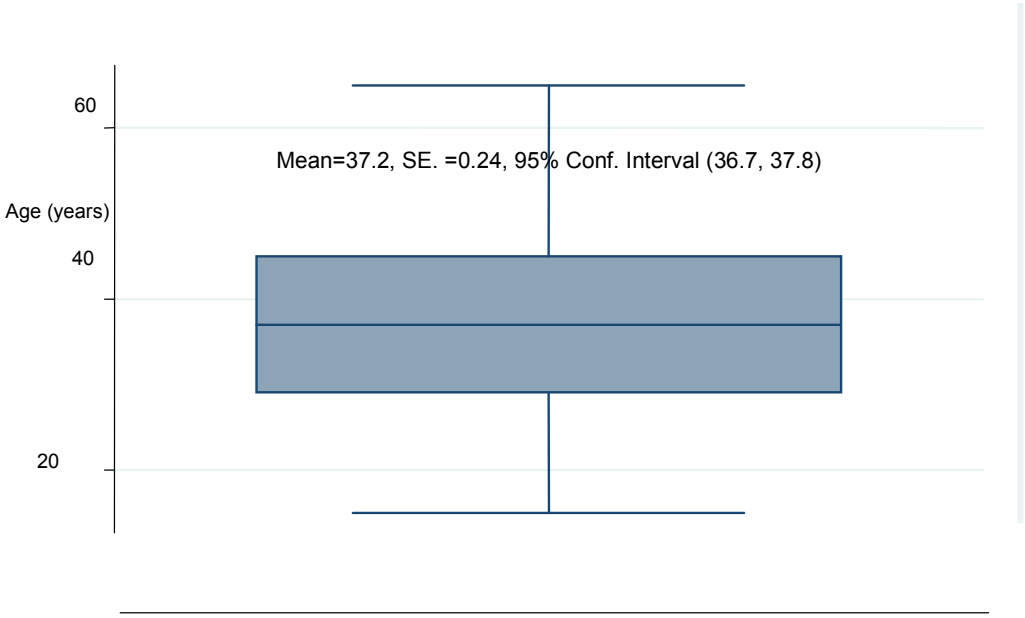

Figure 4.1: Distribution of the Study Population by Age

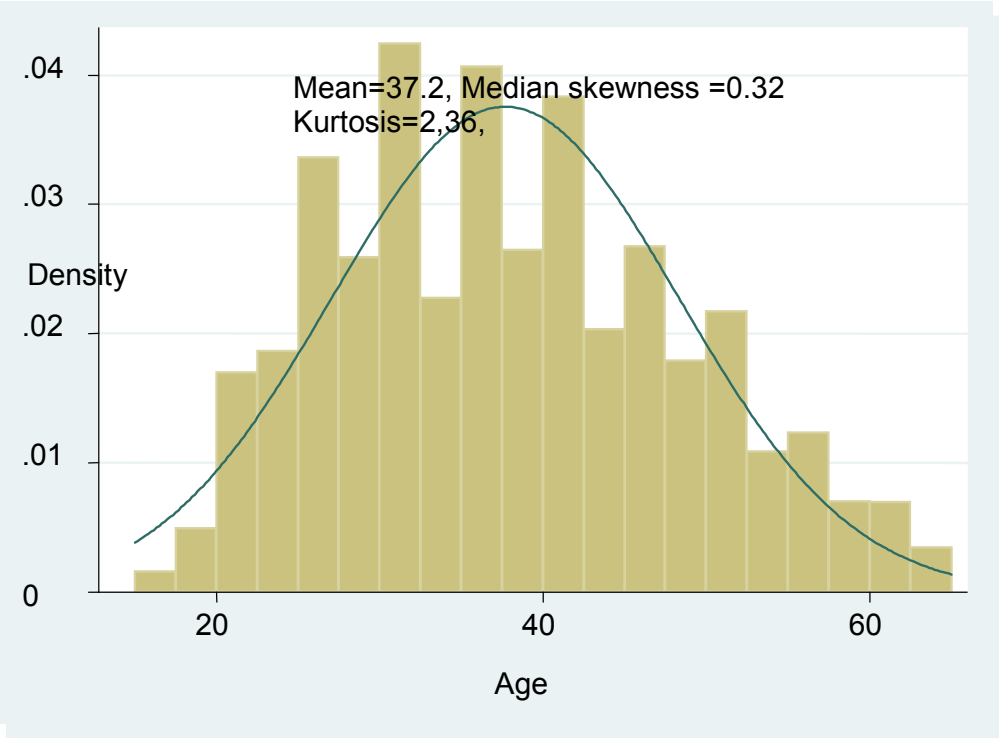

Figure 4.2 Histogram on age distribution

For the 894 injuries, the mean age, standard deviation, skewness and kurtosis of the injured workers was 38.74, 10.0, 0.3 and 2.45 respectively. The minimum age was 18years while the maximum was 65 years. Among the 20,857 non-injuries, the mean age, standard deviation, skewness and kurtosis of the workers was 37.60, 10.6, 0.32, and 2.37 respectively. Further analysis showed that age of those injured and that of the uninjured were normally distributed but statistically different, $p<0.01$ with the mean age of those injured more than that of those not injured.

4.1.2 Gender

Although males constituted 56.4 %(12,327/21751) of the study population, X^2 test indicated no statistically significant difference in proportion between the two sexes by age ($p=0.22$). Also, there was no difference in the distribution of study population by gender in the provinces ($p= 0.23$). However, there was statistically significant difference ($p<0.01$) in gender distribution among those injured and those not injured.

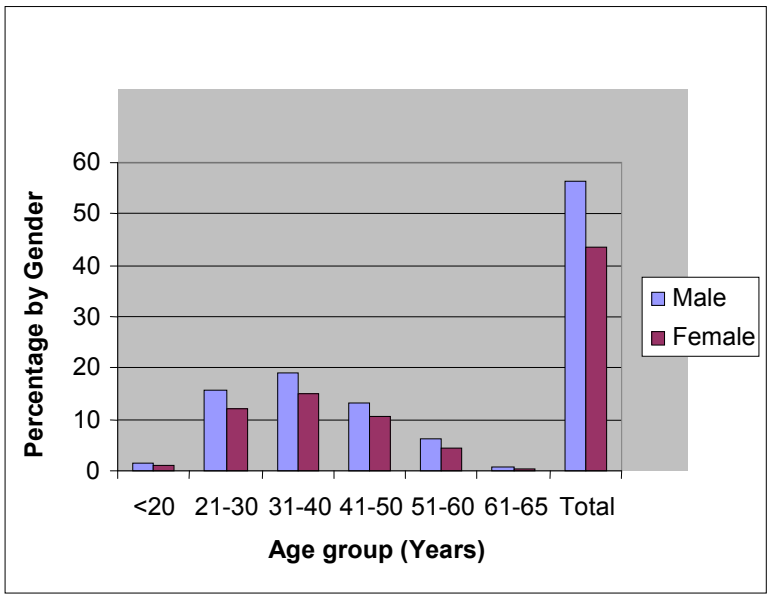

Figure 4.3: Distribution of Study Population by Age and Gender

4.1.3 Ethnicity

The percentage of African Black was greater than any other among the respondents and the ethnic group classified as "Other" had the lowest percentage across all the age groups (Fig. 4.4). The White race was below 5% across all the ages except in the 31- 40 age groups where it was slightly more than 5% (Fig.4.4). The observed variation in the distribution of race by age among the workers was found to be statistically significant at ($p<0.01$) by use of X^2 test.

Out of 21,750 respondents, the majority (64.1%) were African Black while the least in number were the "Other race" (Table 4.6). It was noted that there were more African Blacks in Gauteng (17%) and KwaZulu Natal (14%) while Coloureds were more in Western Cape (9.1%). The proportion of the Indian/Asian race was highest in KwaZulu Natal (2.7%) and the highest percentage of Whites was in Gauteng (7.7%)(Results not shown). Further analysis on the distribution of the study population by race and age showed that, the proportion of the African Blacks was the highest across all the age groups (Figure 4.4).

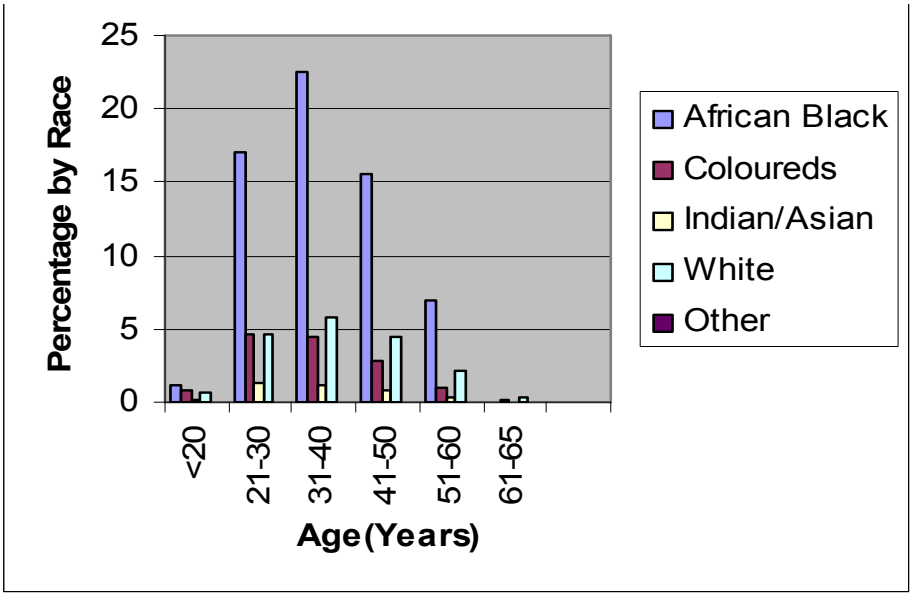

Figure 4.4: Distribution of Study Population by Age and Race

Except in Western Cape where the Coloureds constituted the higher percentage (9.1%) than the other ethnic groups, the African Blacks were more in number in every other province. Chi square(X^2) test on ethnic distribution by province was statistically significant at $p<0.01$(Results not shown). For the African Blacks and the Coloureds, the difference between the proportion of the injured and those uninjured was found to be statistically significant at $p<0.01$ and $p<0.05$ respectively. Distribution of all the other ethnic groups was not statically different in respect to those who sustained injuries and those who did not

4.1.4 Province of Residence

Out of 21,751 respondents, 24% were from Gauteng and18.4% from KwaZulu Natal, while Northern Cape and Free State contributed the smallest number of the respondents at 2.4% and 6.5% respectively. The X^2 test indicated that the distribution of study population among all the provinces was not statistically different (results not shown). However, the difference in distribution by province between the injured and uninjured was statistically significant at $p<0.05$ for all the provinces.

4.1.5 Rural and Urban Residence

Out of 21,751 respondents, majority, 72% (14,387) of the respondents in this study were from urban areas while only 28% were rural based (Fig. 4.5 and Table 4.6). The distribution of gender by rural urban residence was not statistically different ($p = 0.17$).

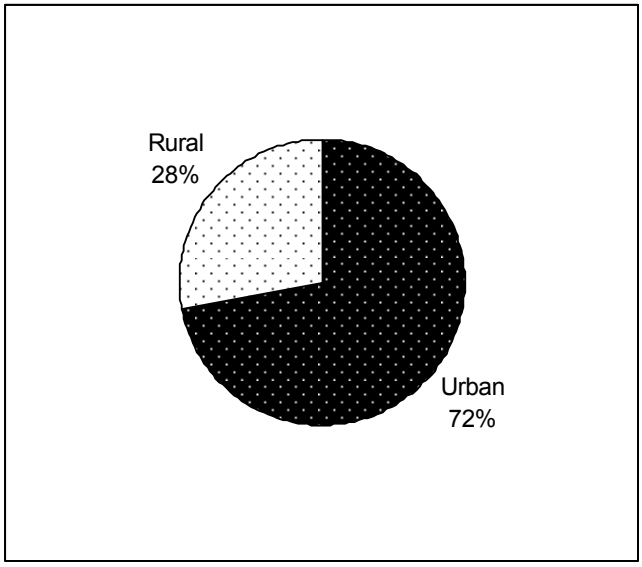

Figure 4.5: Distribution of the Study Population by Urban and Rural Residence

4.1.6 Employment sector

Out of 21, 751 respondents majority, 80% (16897) were employed in the formal sector, while only 20% worked in the informal sector (Fig. 4.6). The distribution of gender by formal/ informal sectors was found to be statistically significant at $p<0.01$. More workers were in the formal sector.

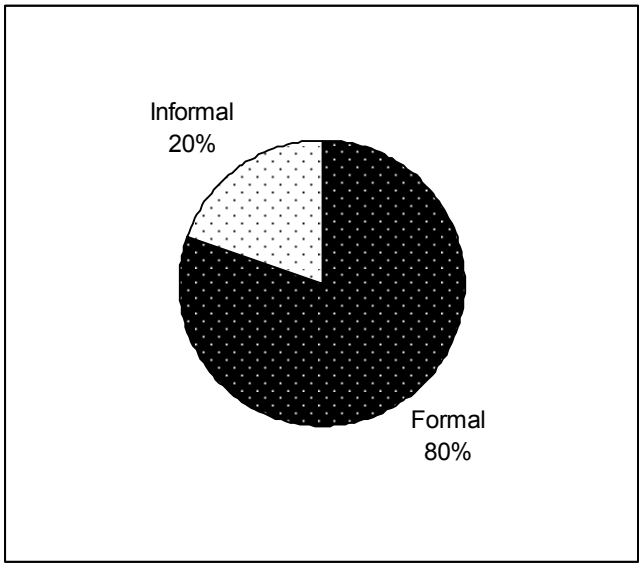

Figure 4.6: Distribution of the Study Population by Employment Sector

4.1.7 Duration of Work

The mean duration of work among the study population was 7.4 years, ranging from 0.17 years to 33 years. The highest percentage ,71.7% (15,431) of the study population had worked for three years or less, followed by those who had worked for 4 - 8 years at 20.1%(4414)(Table 4.9). For both males and females, the trend in duration of work was similar where the proportion of workers decreased with increased duration of work (Fig.4.7). Using the X^2 test, the difference in the duration of work between males and females was statistically significant at $p<0.01$.

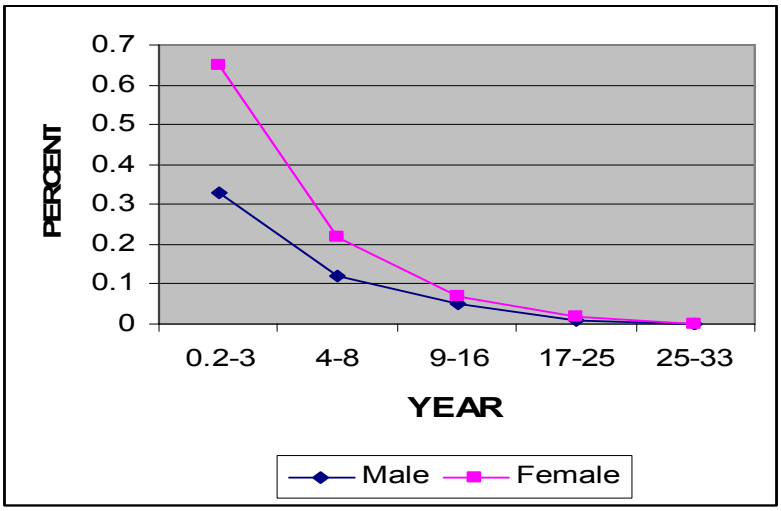

Figure 4.7: Distribution of Study Population by Gender and Duration of work

4.1.8 Type of Employment

About 78% of the workers were employed on permanent basis while the least number (1.1%) was in seasonal employment (Fig.4.8).

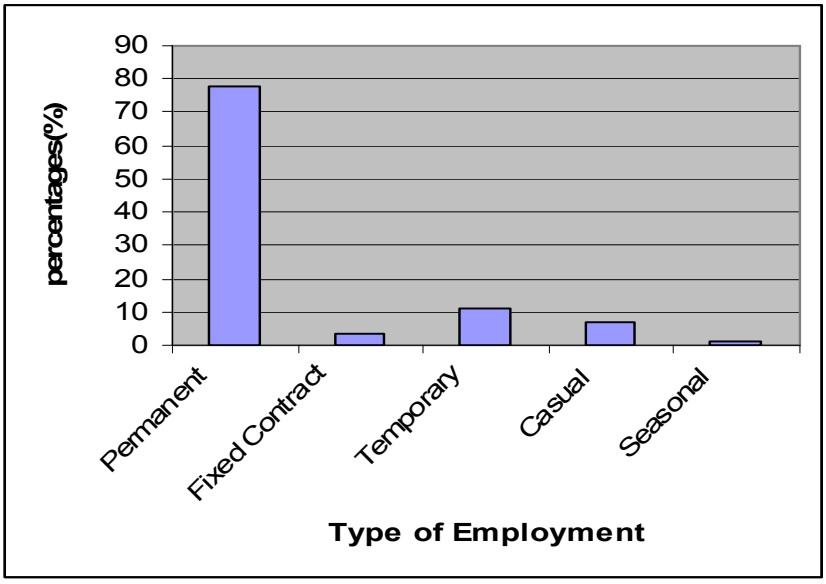

Figure 4.8: Distribution of the Study Population by type of Employment

4.1.9 Economic Activities

In respect to 21,570 study participants who said they carried out an economic activity of one kind or another, about 55.6%(11,940) of them ran their own businesses while only 2.8% were on paid jobs(Table 4.1). Majority,98.1% (21,122) worked for no pay and 87%(18,675) worked at home (Table 4.1). The table depicts that, only 1.2% earned their living from a construction activity. Beggars and those who caught food as an economic activity comprised small percentages of 0.1% and 1.8% respectively. Further analysis indicated that workers were involved in more than one economic activity showing that the responses elicited by the questions were not mutually exclusive or well understood by the respondents.

As regards tenure of work, out of 21751, majority 1, 8312 (85%) worked under supervision while slightly above 50% had written contracts and a similar percentage contributed to a pension scheme. About 56% of workers earned R3500 or less per month (Table 4.2).

Table 4.1: Distribution of Study Population by economic activities

Occupations of study population	Percentage of study population	
Economic Activity	**No.**	**(%)**
Own business		
Yes	**11,940**	**55.6**
No	**9,630**	**44.4**
Total	**21,570**	**100**
Paid Job		
Yes	**629**	**2.8**
No	**21,122**	**97.2**
Total	**21,751**	**100**
Unpaid job		
Yes	**2,818**	**13**
No	**18,933**	**87**
Total	**21,751**	**100**
Working at home		
Yes	**18,675**	**87**
No	**3,076**	**13**
Total	**21,751**	**100**
Farming		
Yes	**43**	**0.2**
No	**21,708**	**99.8**
Total	**21,751**	**100**
Construction		
Yes	**266**	**1.2**
No	**21,485**	**98.8**
Total	**21,751**	**100**
Catch food		
Yes	**32**	**1.8**
No	**21,719**	**98.20**
Total	**21,751**	**100**
Beg for food		
Yes	**18**	**0.1**
No	**21,733**	**99.9**
Total	**21,751**	**100**

4.1.10 Main Industry and Main Occupations

In respect to main occupations, table 4.3 shows that, the commonest occupations were elementary occupation (18.1%) followed by wholesale and retail trade (15%). The smallest number of workers were in unskilled agriculture and fisheries (3.2%), followed by those who were in the legislator/senior officials/managers category at 4.2% (Table 4.3). Main industry had twelve sub-sectors. The commonest sub-sector was community and private households (20.7%), followed by manufacturing (15.6%) and wholesale and retail trade at 15% (Table 4.3).

Table 4.2: Distribution of the study population by tenure of work and income

Tenure of work	Proportion of study population	
	No.	**Percentage**
Written contract(n=21054)		
Yes	**11,815**	56.1
No	**9,239**	43.9
Total	**21054**	**100**
Supervised work(n=21571)		
Yes	**1,8312**	84.9
No	**3,260**	15.1
Total	**21751**	**100**
Pension contribution(21148)		
Yes	**10,625**	50.2
No	**10,523**	49.8
Total	**21148**	**100**
Income Groups (Rand / Month)(n=21751)		
R0	**109**	0.5
R1-500	**1849**	8.5
R501-1500	**4111**	18.9
R1501-3500	**6264**	28.8
R3501-6000	**5024**	23.1
R6001-11000	**2915**	13.4
>11000	**1479**	6.8
Total	**21751**	**100.0**

4.1.11 Distribution of Industry Workers by Gender and Age

In regards to gender composition in the industry sub-sectors, more males than females worked in almost all the sectors, except two (Table 4.4). More females were found working in the Community, personal service and private households, as well as in agriculture, hunting and fishing industries. Interestingly, the female workforce in the agriculture, hunting and fishing industrial sub-sector was eight times more than that of males. In mining and construction industrial sub-sectors, males are twenty seven and eight times more than females respectively. This gender distribution of working in main industry was found to be statistically significant at $p<0.001$ by X^2 Test.

Table 4.3: Distribution of Study Population by Main Occupations and Industry

Main Occupation(n=21605)	**Proportions of workers**	
	No.	**%**
Legislators, senior officials and managers	**660**	3.05
Professionals	**786**	3.64
Technical and associate professionals	**2285**	10.58
Clerks	**2153**	9.97
Community and Personal Service Workers	**2360**	10.92
Unskilled Agriculture and fishery Workers	**746**	3.45
Crafts and Related Trades	**2702**	12.51
Plant and machine operators	**2696**	12.48
Elementary Occupation	**4722**	21.86
Domestic Workers	**2495**	11.55
Total	**21605**	**100**
Main Industry (n=21, 626)		
External Organisations,& Foreign Government	**16**	12.94
Mining and Quarrying	**1485**	6.87
Manufacturing	**3009**	13.91
Electricity, Water, Energy	**194**	0.9
Construction	**1150**	5.32
Wholesale& Retail Trade	**2992**	13.84
Transport & communication.	**995**	4.6
Finance, Insurance &Business service	**1657**	7.66
Community, Personal Service and Private	**4320**	19.98
Households	**2963**	13.7
Agriculture/Hunting/ Fishing/ Forestry	**2999**	0.07
Other	**46**	12.94
Total	**26626**	**100**

In regards to the main industry, further analysis of gender composition of the main occupation by various categories revealed a difference in distribution that was statistically significance at $p<0.01$(Table 4.4). The number of male workers was greater in all the sub-sectors except, in community, personal service and private households and in agriculture, hunting and fishing where they constituted only 6.2% and 10.2% respectively. The ratio of male to female was highest in manufacturing (2:1), Mining and Quarrying (5:1), Construction (8:1), transport and communications (3:1) and plant and machine operation (5:1).

It was, however, observed that, workers earned their livelihood by carrying out more than one economic activity. For example out of 21605 who are in main occupation sectors, 11860 (56%)

had own business.. This means that the responses to economic activities, main occupation and main industry were not mutually exclusive.

4.2 BIVARIATE ANALYSIS OF THE ASSOCIATION BETWEEN INJURY OCCURRENCE AND SOCIO- DEMOGRAPHIC AND OCCUPATIONAL CHARACTERISTICS

The second objective of this study was to describe the distribution of incidence of injury by socio-demographic characteristics and occupations. Firstly, this section presents an overview of occurrence of single and multiple injuries, seeking of medical care after injury and permanent disability from injuries sustained in the study population. Thereafter, data from bivariate analysis through cross tabulations between at least one injury per year (outcome variable) with independent (socio-demographic and occupational) variables were presented and discussed in detail.

4.2.1 Single and Multiple Injury Occurrences, Seeking Medical Care and Permanent Disability

Table 4.5 depicts that, 894 out of 21751 (4%) workers had at least one injury during the twelve months preceding the survey. Due to multiple injuries, the number of those injured reduced to 881 of which 619 (68.7%) had one injury followed by 16.3% with two injuries(Table 4.5). The major causes of these injuries were a fall or object falling (42%) while injuries caused by machinery and tools amounted to 39.4%. Most of those injured (58.8%) stayed in bed or at home for a day or more and 73% sought medical attention after injury. About 62.7% had pain for more than a week while only 6.3% sustained permanent or long term disability.

Table 4.4: Proportion of workers by Main industry, Main Occupation and Gender

Industrial and Occupational Sub-Sectors	GENDER				Total		X^2 Test
	Male		Female				
MAIN INDUSTRY (21626)	**No.**	**%**	**No.**	**%**	**No**	**%**	**p<0.01**
Agriculture, hunting and Fishing	1,944	6.2	854	2.8	2,799	12.94	
Mining and Quarrying	1,418	5.5	67	0.2	1,485	6.87	
Manufacturing	1,940	10.2	1,069	5.4	3,009	13.91	
Electricity, Water, Energy	157	0.9	37	0.2	194	0.90	
Construction	1,031	4.9	119	0.6	1,150	5.32	
Whole Sale& Retail Trade	1,568	8.1	1,424	6.9	2,992	13.84	
Transport & communication.	802	4.2	193	1	995	4.60	
Finance, Insurance &Business service	921	4.9	736	4.4	1,657	7.66	
Community, Personal Service and Private Households	1,915	9.1	2,405	11.6	4,320	19.98	
Forestry	525	2.3	2,438	10.2	2,963	13.70	
External organisation & Foreign Government	9	0.0	7	0.0	16	0.07	
Other	28	0.3		0.3	46	0.21	
Total	12258	56.4	9368	43.6	21626	100	
MAIN OCCUPATION (n=21605)	No	%	No	%	No	%	
Legislators, senior officials and managers	505	3.3	155	1.0	660	3	
Professionals	392	2.3	394	2.2	786	3.5	
Technical and associate professionals	988	5.4	1,295	6.5	2285	10.6	**p<0.01**
Clerks	710	3.5	1,443	8.1	2153	10	
Community and Personal Service Workers	1,385	6.8	975	4.8	2360	11	
Skilled Agriculture. and fishery Workers	667	2.8	79	0.4	746	3.4	
Crafts and Related Trades	2,358	11.2	344	1.5	2702	12.5	
Plant and machine operators	2,297	9.9	399	1.9	2696	12.5	
Elementary occupation	2,834	10.7	1,886	7.5	4722	21.9	
Domestic Work	107	0.5	2,388	1.0	2495	11.6	
Total	12,243	56.4	9,358	43.6	21605	100	

4.2.2 Association of Socio-demographic Characteristics and Injury Occurrence

By use of bivariate analysis, association between occurrence of at least one injury, was statistically significant with age ($p<0.05$), gender ($p<0.01$), race ($p<0.01$) and province of residence ($p=0.03$) but not with rural/urban residence (Table 4.4)

a) Age

Though occurrence of injuries varied with age, more injuries occurred among workers in the age bracket 31-40 years at 1.4% followed by those between 41-50 years (1.0%). The least percentage of injuries was among those who were less than 20 years old (Table 4.6). Figure 4.9 depicts the trends of injury incidence with increase in age. At age group 31- 40, the number of injuries peaked and then declined steadily thereafter, but shot up at age group 61- 65 years.

b) Gender

Though the proportions of males to females was more less equal in the workforce, the percentage of injuries among males and females was 3.0 and 0.8 respectively (Table 4.6), which translated to males/females risk ratio of 2.4:1.

c) Ethnicity

A high percentage of injuries occurred among African Blacks followed by those among Coloureds (Table 4.6). Further analysis showed that, the proportion of African Blacks to Coloureds was 3:1 while the ratio of injuries between the two ethnic groups was 7:1.

d) Residence

From table 4.6, it was observed that, the distribution of injuries by province of residence was statistically significant at $p<0.05$. Gauteng province contributed 26.3% of workers to the workforce and injuries at 0.9%. There was no association between injury occurrence and urban /rural residence from X^2 test ($p=0.2$).

4.2.3 Association of Occupational Characteristics and Injury Occurrence

Occupational and occupationally related characteristics involved in this analysis were economic activities, employment (duration of work, tenure, sector), main industry, main occupation and income.

a) Economic Activities

Economic activities that were cross tabulated with injury occurrence to determine association were own business, paid job, unpaid job, domestic work, farming, and construction. Association between injury occurrence with unpaid jobs and domestic work were the only ones found to be statically significant at $p<0.01$(Table4.7)

b) Tenure of Employment and injuries

The tenure of employment variable comprised sub-variables such as written contracts, supervised work, pension contribution and paid leave. The association between written contract and pension contribution and occurrence of injuries was found to be statistically significant at $p<0.01$, and that with supervised work and paid leave statistically significance at $p=0.05$ (Table 4.7)

Table 4.5: Single and Multiple injuries, Causes and Post Injury actions

Event	Proportion of respondents		95% Confidence Interval	**Rate per 1000**
	No	**%**		
Injured? **n=21751**				
Yes	894	4.0	3.4-4.3	40.0
No	2857	96	95.7-96.6	960
Number of Injuries (n=881)**				
Once	619	70.3	62.0-75.0	660
Two times	145	16.5	13.0-19.0	165
Three times	49	5.6	3.3-9.2	56
Four times	25	2.8	1.9-3.9	28
Five times	39	4.3	1.0-9.4	440
Six times	4	0.5	-1 -1.3*	50
Stayed in bed/home? n=873**				
Yes	512	58.8	54.2-63.4	588
No	361	41.2	36.6-45.8	412
Sought medical care? **n=873****				
Yes	634	73	66.7-79.0	730
No	239	27	21.0-33.0	270
Injury pain for more than a week n=872**				
Yes	548	63.7	58.8-68.6	637
No	324	37.3	31.4-41.0	373
Disabling injury n=871**				
Yes	57	6.3	4.8-8.8	63
No	814	93.7	91.7-95.2	937
Cause of injury n=873**				
Machinery/tools	350	39	33.0-45.9	390
Fall/falling objects	360	42	32.6-50.5	420
Person	56	7	5.2-8.5	70
Animal	23	2	0.1-4.0	20
Other	83	10	7.8-12.4	100

NB:

* Not statistically significant as the confidence level crosses zero.

** No responses to the questions ranged from 11-23

Table 4.6: Study Population and Occurrence of Injuries by Socio-demographic Characteristics

Characteristic	Study Population Percent		Injury Proportion		Injury Incidence Rate/1000 Workers	p-Values
	No.	%	No.	%		
Age Group(n=21751)						
<20	618	2.7	11	0.1	0	
21-30	5769	27.7	195	0.9	9	***p=0.02***
31-40	7147	34.1	320	1.4	14	
41-50	5291	23.6	237	1.0	10	
51-60	2526	10.5	115	0.4	4	
6 1-65	400	1.4	16	0	0	
Total	**21751**	**100**	**894**	**3.8**	**37**	
Gender(n=21751)						
Males	12,327	56.4	691	3.0	**30**	
Females	9,420	43.6	203	0.8	**8**	**p < 0.01**
Total	**21751**	**100**	**894**	**3.8**	**38**	
Ethnicity(n=21750)						
African Black	14991	64.1	668	2.8	28	
Coloured	3587	14.0	144	0.5	5	**p < 0.01**
Indian/Asian	618	3.7	14	0.1	1	
White	2527	18.0	65	0.4	4	
Other	27	0.001	3	0.1	1	
Total	**21750**	**100**	**894**	**3.8**	**38**	
Province of Residence (21751)						
Western Cape	3463	15.9	118	0.5	5	
Eastern Cape	1963	9.0	45	0.2	2	***p= 0.03***
Northern Cape	1194	5.5	58	0.1	1	
Free State	2030	9.3	128	0.4	4	
KwaZulu Natal	3315	15.2	141	0.8	8	
North West	2083	9.6	97	0.4	4	
Gauteng	4216	19.4	150	0.9	9	
Mpumalanga	1778	8.2	90	0.3	3	
Limpopo	1709	7.9	66	0.2	2	
Total	**21751**	**100**	**893**	**3.8**	**38**	
Urban/Rural Residence (n=21751)						
Urban	14,386	71.9	541	2.6	26	***p= 0.2***
Rural	7,365	28.1	353	1.3	13	
Total	**21751**	**100**	**894**	**3.9**	**38**	

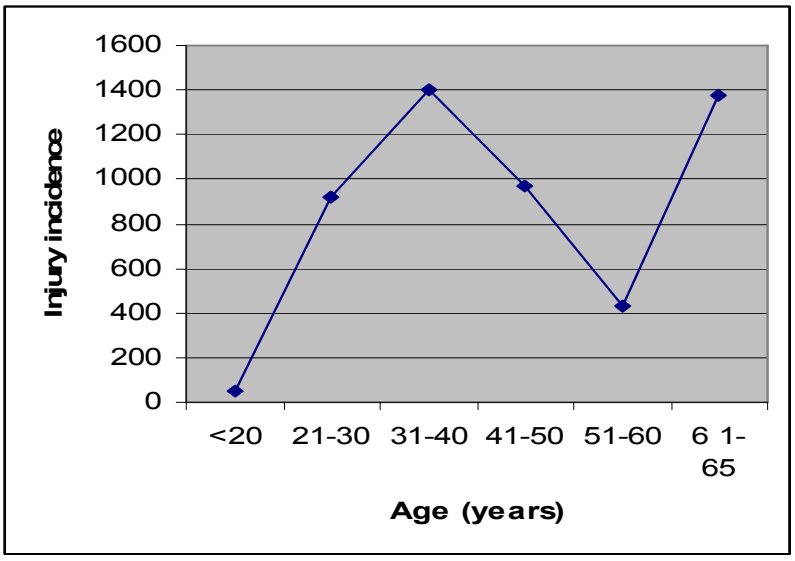

Figure 4.9: Distribution of Injury occurrences by Age

c) Main Industry

The distribution of injury occurrence was statistically significant across all the sub sectors in the main industry sector at $p<0.01$(Table 4.8). However, although mining and quarrying made up only 5.7 % of the workers, it was second to manufacturing in the number of overall injuries (0.7%). Private households though constituting 12.5% of workforce reported only 0.2% of the injuries.

d) Main Occupations and Injuries

Overall, association of injuries with various occupations was statistically significant at $p <0.01$(Table 4.8). The table 4.8 further depicts that, although domestic workers comprised only 10.4% of the total work force, they contributed the highest percentage (1.4%) of injuries. Elementary occupation which constituted the largest percentage of workers, contributed only 0.8% of the total injuries in main occupations and no injuries were recorded among legislators, senior officials and managers as well as professional technical Occupations (Table 4.8).

Table 4.7. Distribution of the Study population and occurrence of Injuries by Economic Activities and tenure of work

Independent Variable	Proportion of Study population		Injury proportion		(p-Values)
Economic Activity	**No.**	**%**	**No.**	**%**	**P=- Values**
Own business (21570)					
Yes	**11,940,**	**56.0**	**540**	**4.5**	P=0.07
No	**9,630**	**44 .0**	**11400**	**95.5**	
Total	**21570**	**100**	**11940**	**100**	
Paid job (n=21751)					
Yes	**629**	**3.0**	**31**	**5.2**	P=0.57
No	**21122**	**97.0**	**598**	**94.5**	
Total		**100**	**629**	**100**	
Unpaid Job (n=21751					
Yes	**2818**	**13.0**	**47**	**1.7**	P<0.01
No	**18933**	**87.0**	**2771**	**98.3**	
Total		**100**	**2818**	**100**	
Domestic work					
Yes	**18675**	**86**	**835**	**4.5**	P=0.01
No	**3,076**	**14**	**17840**	**95.5**	
Total		**100**	**18675**	**100**	
Farming (n=21751)					P=0.40
Yes	**43**	**0.2**	**1**	**0.2**	
No	**21708**	**99.8**	**42**	**99.8**	
Total	**21751**	**100**		**100**	
Construction (n=21751)					
Yes	**266**	**1.2**	**18**	**6.8**	P=0.07
No	**21485**	**98.8**	**248**	**93.2**	
Total	**21751)**	**100**	**266**	**100**	
Catch Food (n=21751)					
Yes	**32**	**0.15**	**3**	**0.1**	P=0.3
No	**21719**	**98.5**	**29**	**99.9**	
Total	**21751**	**100**	**32**	**100**	
Beg for food (21751)					
Yes	**18**	**0.1**	**0**	**0**	P=0.6
No	**21719**	**99**	**18**	**100**	
Total	**21751**	**100**	**18**	**100**	
Tenure of employment					
Written Contract (n=21054)					
Yes	**11815**	**56**	**536**	**4.5**	
No	**9239**	**44**	**11279**	**95.5**	P<0.01
Total	**21054)**	**100**	**11815**	**100**	
Supervised work (n=21572)					
Yes	**18312**	**85**	**794**	**4.3**	
No	**3260**	**15**	**17518**	**95.6**	P=0.05
Total	**21571**	**100**	**18312**	**100**	
Pension Contribution (n=21148)					
Yes	**10,625**	**50.2**	**531**	**5.0**	P < 0.01
No	**10,523**	**49.8**	**10,187**	**95**	
Total	**21148**	**100**	**10,625**	**100**	

4.2.4 Association between Injury Occurrence and Other Occupationally-Related Characteristics

Overall there was an association between duration of work and injury occurrence at p<0.01. The highest percentages of injuries were sustained by 71.7% of the workers who had worked for the shortest period of 0.17 to 3 years (Table4.9).

Association of income and injuries was not statistically significance(Table 4.9). Overall, the distribution of injuries by type of employment was found to be statistically significant at p<0.05 (Table 4.9). Permanent employees contributed the highest percentage at77.7% (16625) of workers in the workforce as well as the largest percentage at 3.2% (693/21599) of injuries. Association of injuries and paid leave was borderline at p=0.05).

Table 4.8 Distribution of the Study Population by Occurrence of Injuries, Main Industrial and Occupational sectors

Sector	Study population		Injury Proportion and X^2Test		
	No.	(%)	No.	%	P-Value
Main Industry (n=21626)					
External Organisations,& Foreign Government	**16**	**0.07**	**0**	**0**	
Mining and Quarrying	**1485**	**6.9**	**167**	**0.7**	
Manufacturing	**3009**	**13.9**	**147**	**0.8**	
Electricity, Water, Energy	**194**	**0.9**	**5**	**0**	
Construction	**1150**	**5.3**	**62**	**0.3**	
Whole Sale& Retail Trade	**2292**	**13.8**	**97**	**0.4**	**P<0.01**
Transport & communication.	**995**	**4.6**	**54**	**0.3**	
Finance, Insurance &Business service	**1657**	**7.66**	**28**	**0.2**	
Community, Personal Service and Personal Services	**4320**	**20.0**	**133**	**0.6**	
private households	**2963**	**13.7**	**52**	**0.2**	
Agriculture, hunting, forestry and fishing*	**2799**	**12.5**	**145**	**0.5**	
Other	**46**	**0.2**	**1**	**0**	
Total	**21626**	**100**	**891**	**4**	
Main Occupations (216050					
Legislators, senior officials and managers	660	4.20	9	0	
Professionals	786	4.50	14	0	
Technical and associate professionals	22850	11.9	51	0.3	**P< 0.01**
Clerks	2153	11.6	24	0.1	
Service workers and shop and market sales workers	2360	11.60	78	0.4	
Skilled agricultural and fishery workers	746	3.2)	31	0.1	
Craft and related trades workers	2702	12.70	204	0.9	
Plant and machine operators and assemblers	2696	11.8	222	1.0	
Elementary Occupation	4722	18.10	219	0.8	
Domestic workers	2495	10.4	39	0.1	
Total	21626	**100**	891	**3.7**	

Table 4.9: Occurrence of Injuries in the Study population by Duration of work, Type of Employment, income and paid leave

Occupationally related characteristics	Study population		proportion of injuries		X^2Test P-Values
	No	%	No.	%	
Duration of Work (years), n= 21751					
0.17 -3	**15,431**	**71.7**	**557**	**2.5**	
4 - 8	**4414**	**20.3**	**230**	**1.0**	
9 -16	**1541**	**7.1**	**93**	**0.4**	**P<0.01**
17-25	**328**	**1.5**	**12**	**0**	
>=26	**37**	**0.2**	**2**	**0**	
Total	**21751**	**100.0**	**894**	**3.9**	
Income Groups (Rands/ month), n=3891					
R0	**21**	**0.5**	**24**	**0.1**	
R1-500	**400**	**10.3**	**65**	**0.3**	
R501-1500	**845**	**19.00**	**193**	**0.8**	
R1501-3500	**1152**	**28.8**	**196**	**0.9**	**P=0.1**
R3501-6000	**842**	**23.1**	**149**	**0.6**	
R6001-11000	**439**	**13.5**	**87**	**0.4**	
>11000	**192**	**6.4**	**174**	**0.8**	
Total	**3891**	**100.0**	**894**	**3.9**	
Type of Employment (n=21599)					
Permanent	16625	77.70	693	3.2	
Fixed Contract	801	3.60	44	0.2	
Temporary	2410	10.9	89	0.4	**P<0.05**
Casual	1464	6.7	42	0	
Seasonal	299	1.0	26	0	
Total	**21599**	**100.0**	**894**	**3.8**	
Paid leave (n=21297)					
Yes	12307	58	572	4.6	
No	8990	42	11735	95.4	**P < 0.05**
Total	**21297**	**100**	**12307**	**100**	

4.3 LOGISTIC REGRESSION

To meet the third objective of this study, logistic regression was used to investigate the association between socio-demographic and occupational characteristics and occurrence of injury. All the explanatory variables whose association with the outcome variables were found to be statistically significant by X^2 tests (Bivariate Analysis) were used in the logistic regression analysis to determine the direction and magnitude of the association

4.3.1 Age

The overall regression model was statistically significant at $p<0.05$. As a continuous variable, the odds of an injury was 1.0. However, when age was categorised into age groups, the association with injuries was statistically significant for both CORs and AORs except for age group 41-50 years (Table 4.10). The odds ratios increased with age from 1.0 at <20 years to 2.62 among the 61-65 year olds. From the adjusted analyses, those workers in age group 21-30 years were 1.96 times more likely to have an injury compared to those who are less than 20 years of age. At the subsequent ages groups the odds of sustaining an injury went up to 2.4 times or more compared with the reference group while maintaining statistical significance at $p<0.05$.

4.3.2 Gender

The overall model was statistically significant at $p<0.01$(Table 4.10). Both the COR and AOR indicated that, females were less likely to sustain injuries than males.

4.3.3 Ethnicity

Although, the overall regression model was statistically significant at $p<0.05$, the adjusted analysis showed significant association between injuries and all other ethnic groups except coloured and Whites at $p==0.17$ and $p=0.06$ respectively (Table 4.10). Notably, the CORs between injuries and all the other races was statistically significant at $p<0.05$. From the AORs, the odds of the Asian/Indian workers being injured is 54% less than the odds of the reference group (African Black) while the "Other" race group of workers are 5.3 times more at risk of injury than that of the reference group.

4.3.4 Province of Residence

Although Gauteng had the highest worker injury occurrence rate among all the provinces, the adjusted odds ratio analysis show that workers in this province are actually 8% less likely to have injuries than those in Western Cape, the province of reference (Table 4.10). It was only Free State and Mpumalanga which were significantly associated with worker injuries.

Workers in Free State and Mpumalanga were 1.5 and 1.3 times more likely to sustain injuries compared to Western Cape.

4.3.5 Income

Statistically, neither the CORs nor the AORs across all the income categories were significantly associated with injuries among the workers (Table 4.10).

4.3.6 Economic activities and related characteristics

From X^2 Test, the economic activities and related characteristics found to be associated with incidence of injuries were; unpaid job ($p<0.01$), domestic work ($p<0.01$),employment sector ($p<0.01$), written contract ($p<0.01$), supervised work ($p<0.05$), pension contribution ($p<0.01$), paid leave ($p<0.05$), main industry ($p<0.01$), main occupation ($p<0.01$), duration of work ($p<0.01$), income (rands) /month ($p<0.05$), and type of employment ($p<0.05$).

4.3.7 Economic activities, type and tenure of employment

Both the CORs and AORs for the association of injuries with both unpaid and domestic work were statistically significance at $p<0.01$(Table 4.11). The adjusted analyses showed that, the odds of injury among those on paid job is 2.4 times more than among those in unpaid job while the odds of non- domestic workers being injured was 46% less than that of domestic workers. With reference to permanent work, the association between injuries and fixed contract, temporary and seasonal employment were not statistically significant (Table 4.11). It is only the association between casual work and injuries that had both the COR and AOR that were statistically significant. Adjusted OR indicates that the odds of injury among the casuals were 62% less than among those in permanent employment

Written contract, pension contribution and paid leave were the only ones under tenure of employment whose association with injuries was found to be statistically significant. Adjusted analysis showed that those workers without written contract were 18% less likely to be injured than those with written contracts (Table 4.11). The table also showed similar phenomenon in respect to pension contribution and paid leave. In respect to both the COR and AOR , the odds of those without pension contribution being injured is 30% less than the odds of those with pension

contribution, those without paid leave were 28% less likely to sustain injuries than those with paid leave.

Table 4.10: Logistic Regression Analysis of Incidence of Injuries by Socio- Demographic and Income Characteristics

Characteristic	**Crude Odds Ratios (CORs), [95% CI], and (p-values)**	**Adjusted Odds Ratio (AORs), [95% CI] and [p-values]**
Age(years) n=21751		
<20(reference)	1	1
21-30	1.96 [1.0, 3.6] (0.04)	1.96 [1.10, 3.46] (0.03)
31-40	2.47 [1.4, 4.5] (0.01)	2.5 [1.42, 4.46] (0.01)
41-50	2.44 [1.3, 4.7] (0.01)	2.5 [1.3, 4.69] (0.09)
51-60	2.42 [1.1, 5.5] (0.04)	2.4 [1.13, 5.23] (0.03)
61-65	2.62 [1.1, 6.1] (0.03)	2.6 [1.13, 5.80] (0.03)
Gender n=21747		
Male(Reference)	1	1
Female	0.35 [2.2, 3.8) (0.00)	0.36 [0.26, 0.48] (0.000)
Race n=21750		
African Black(Reference)	1	1
Coloured	0.82 [0.9, 1.6] (0.17)	0.95 [0.68, 1.3] (0.77)
Indian/Asian	0.52 [1.1, 3.4] (0.03)	0.46 [0.26, 0.8] (0.01)
White	0.54 [1.0, 3.3] (0.04)	0.58 [0.3, 1.04] (0.06)
Other	5.68 [0.02, 0.71] (0.02)	5.3 [1.3, 21.7] (0.03)
Province of Residence n=21751		
Western Cape(Reference)	1	1
Eastern Cape	0.63 [0.41, 0.97] (0.04)	0.59 [0.30, 1.14] (0.10)
Northern Cape	1.45 [1..5, 1.83) (0.06)	1.26 [0.95, 1.67] (0.1)
Free State	1.8 [0.96, 3.34] (0.06)	1.5 [1.06, 2.17] (0.03)
KwaZulu Natal	1.27 [0.76, 2.13] (0.31)	1.27 [0.99, 1.64) (0.06)
North West	1.42 [0.15, 1.75] (0.00)	1.16 [0.82, 1.63] (0.36)
Gauteng	1.0 [0.80, 1.21] (0.99)	0.92 [0.80, 1.07) (0.25)
Mpumalanga	1.51 [0.97, 2.33] (0.06)	1.3 [1.02, 1.59) (0.04)
Limpopo	1.03 [0.75, 1.42] (0.81)	0.89 [0.57,1.46) (0.55)
Urban/Rural Residence n=21751		
Urban reference	1	*1*
Rural	1.28 [0.85 1.91] (0.23)	1.03 [0.97, 1.10] (0.23)
Income (n=21751)		
Reference(R zero)	1	1
R1-500	1.50[0.17, 13.30] (0.68)	1.26[0.11, 13.9] (0.80)
R501-1500	2.52[0.30, 20.86] (0.35)	2.0 [0.19, 21.9] (0.52)
R1501-3500	1.65[0.20, 13.67] (0.61)	1.1 [0.11, 12.45] (0.90)
R3501-6000	1.49[0.15, 15.05] (0.71)	0.91[0.76, 10.92] (0.93)
R6001-11000	1.57[0.19, 12.89] (0.64)	0.86[0.09, 7.85] (0.88

* adjusted for age, gender, ethnicity and province

4.3.8 Main Industry and Occupation

As for main industry, statistically significant association between the sub-sectors and injuries was observed in only three industries, namely: mining and quarrying ($p<0.01$), finance/insurance /business ($p<0.05$), and private households at $p<0.01$(Table 4.12). Moreover, the odds of sustaining an injury in mining and quarrying was 2.0 times while the other two showed reduced likelihood of injuries by 59% and 62% respectively compared to the reference group (agriculture, hunting and fishing). As such, mining and quarrying was recognised as the most injurious industry followed by the reference industry (Agriculture, Hunting, Fishing and Forestry). Industry sub-sectors with the least likelihood of causing injuries were finance, insurance, and business services (AOR=0. 41). Workers in this sector were 59% less likely to sustain injuries compared to agriculture, hunting, fishing and forestry.

From the adjusted analysis and with the legislators and senior officials as the reference group, association of injuries was found to be statistically significant with only a few occupational categories, namely; crafts and related trade (AOR=4.0), plant and machinery operation(AOR=4.4), and elementary occupation(AOR =2.7) all at $p<0.01$(Table 4.9).

Workers in these occupations were 4.0, 4.4 and 2.7 times more likely of sustaining an injury respectively compared to the reference group. Clerical occupation was 21% less likely (AOR =0.79) to causing injuries compared to the reference occupation.

Overall, association between working duration (continuous variable) and injuries was statistically significant at $p<0.01$ with an odds ratio of 1.02. This means that the likelihood of an injury increases by 2% for every year increase in working duration. When working duration was categorised, both the COR and AOR of sustaining injuries was observed to increase with increase in working duration up to working duration of 9-16 years and then declined thereafter (Table 4.12). The AOR increased from 1 at 0.17-3 years of working duration to 1.38 at 9-16 years. Further investigation found out that, there was a weak correlation between age and working duration($r=0.4276$).

Table 4.11: Logistic Regression Analysis of occurrence of Injuries by Economic Activities and Type of Employment

Characteristic	Crude Odds Ratios, [CORs and (P-values)]	Adjusted Odds* [AORs CI and , (P- values)]
Economic Activity (n=21570)		
Own business		
Yes(Reference)	1	1
No	0.86 (0.07)	0.84 [0.71, 0.98] (0.03)
Unpaid Job n=21751		
Yes(Reference)	1	1
No	0.31 (0.00)	2. 42[1.68, 3.45] (0.00)
Domestic Work n=21751		
Yes(Reference)	1	1
No	0.42 (0.00)	0.54 [0.47, 0.61] (0.00)
Type of Employment(n=21597)		
Permanent(Reference)	1	1
Fixed Contract	1.42 (0.11)	1.25[0.82 1.92] (0.3)
Temporary	0.83 (0.44)	0.79[.54 1.18] (0.22)
Casual	0.34 (0.02)	0.38[0.16 0.86] (0.03)
Seasonal	1.3 (0.56)	1.32[.52 3.34] (0.52)
Tenure of Employment Written Contract(n=21054)		
Yes(Reference)	1	1
No	0.79 (0.01)	0.82[0.72, 0.93] (0.01)
Work Supervision(n=21572)		
Yes(reference)	1	1
No	0.70 (0.05)	0.70[0.79, 1.11] (0.15)
Pension Contribution(n=21148)		
Yes(Reference)	1	1
No	0.68 (0.002)	0.70[0.59, 0.84] (0.002)
Paid Leave(n=21297)		
Yes(	1	1
No	0.75 (0.02)	0.72[0.56, 0.94] (0.02)

* Adjusted for age gender, ethnicity and province

Table 4.12: Logistic Regression Analysis of Occurrence of Injuries by Main Industry, Occupations and Duration of Work

Characteristic	Crude Odds Ratios [CORs and (p=values)]	Adjusted Odds Ratios * (AORs) and (p-values)
Main Industry(n=21610)		
Agriculture, Hunting, Fishing and Forestry	1	1
Mining and Quarrying	2.33 (0.00)	2.02 (0.00)
Manufacturing	.91 (0.58)	1.02 (0.92)
Electricity, Water, Energy	.50 (0.21)	0.50 (0.16)
Construction	1.01 (0.96)	0.96 (0.83)
whole& Retail Trade	.50 (0.02)	0.65 (0.08)
Transport and Communication	.97 (0.92)	0.75 (0.17)
Finance, Insurance &Business service	.30 (0.001)	0.41 (0.00)
Community &Personal Service	.57 (0.04)	0.75 (0.17)
Private Households	0.26 (0.000)	0.38 (0.00)
Other)	0.19 (0.19)	0.24 (0.24)
Legislators, senior officials and managers	1	1
Professionals	.98 (0.96)	1.1 (0.82)
Technical and associate professionals	.1.4 (0.37)	1.6 (0.27)
Clerks	0.6 (0.14)	0.79 (0.56)
Community and Personal Service Workers	1.8 (0.07)	1.9 (0.13)
Skilled Agriculture. and fishery Workers	1.97 (0.09)	1.66 (0.24)
Crafts and Related Trades	4.6 (0.001)	4.0 (0.00)
Plant and machine operators	5.27 (0.00)	4.4 (0.00)
Elementary occupation	2.7 (0.007)	2.7 (0.01)
Domestic Workers	0.76 (0.48)	1.03 (0.96)
Duration of Work (Years) n=21746)		
0.17-3	1	1
4-8	1.46 (0.005)	1.36 (0.03)
9-16	1.55 (0.001)	1.38 (0.02)
17-25	0.76 (0.48)	0.67 (0.24)
26-33	0.56 (0.45)	0.51 (0.35)

* Adjusted for age, gender, ethnicity and province

CHAPTER 5: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 DISCUSSION

The study objective was to determine the association of injuries and occupations among workers aged 15 - 65 years at the general population level in South Africa, who had worked for twelve months prior to the study in February, 2001.

Injury was the outcome variable. Socio-demographic and occupational characteristics were the explanatory (predictor) variables. Univariate, bivariate and socio-demographically controlled multivariate logistic regressions were used to identify predictors of injury among the workers.

The results show injury incidence of 4% among the 21751 workers who participated in the study. The percentage is half that reported by Kielkowski (8.6%) in the same population in 2004 which was obtained by re-analysing two studies[A household survey and the 1998 Demographic and Health Surveys(8)]. The low incidence of injuries in this study could have been an underestimation partly due to the exclusion of respondents (68%) from the study because they had not worked twelve months prior to the study. Dual activities by which the respondents earned their living and one respondent per household responding on behalf of other family members could also have introduced information bias in the study.

Despite all the aforementioned limitations, the percentage of injuries in this study translates into 40 injuries per 1000 workers, a rate within the range that was reported for the South Africa region (0.35 to 49 per 1000) among wage workers (4).

Socio-demographic characteristics that were associated with injuries in this study were; age, gender, ethnicity and province of residence. In respect to age, variation of incidence of injury concurs with data reported in other studies. However, other studies report that although the direction of variation in this study was contradictory. This study indicates that, on average, older workers (31- 40 years) were twice as likely to sustain an injury compared to those who were less

than twenty years. This is inconsistent with findings of other studies that report reduced injury rates with increase in age (15, 16, and 18). It is challenging for the investigator to explain adequately the observed trend. However, it is possible that as age is correlated to duration of work, the longer the duration of work, the more likely the worker is to sustain injury. Further analysis using t-test showed that workers who sustained injury were older than those who were uninjured at $p<0.01$. The mean age of the workers who sustained injuries was 38.7 years in comparison to those who were not injured (37.6 years). Chi square test showed that, the difference in age between the injured and the non-injured was statically significant $p<0.01$. This could partly explain the increase of injury incidence with age.

As regards gender, adjusted analysis indicated that females were 65% less likely to sustain injuries than males. This difference between male and female workers in incidence of injury is in conformity with findings from other studies where males were at a higher risk of sustaining an injury than females. In US, the injury rate for men was 40% higher than the rate for women, while in South Africa, the proportion of injuries in all the provinces was higher for males than that of females (17, 18). Probably, male workers may be involved in more dangerous work than females and may be more likely to engage in risky behaviour than females, thus resulting in a higher injury rate.

In respect to ethnicity, the ethnic group classified as “Other” was 5.3 times more likely to sustain injuries compared to the African Blacks. These findings concur with the United States study where the incident rate of injuries varied with ethnicity with non-Hispanic white adults had the highest injury rates (4.7 /100) followed by non-Hispanic Blacks at 4.0/100 in among employed population (15).

For the province of residence, the percentage of injuries increased with the provincial percentage of workforce. However, injuries were not proportional to the workforce. For example, Limpopo and Eastern Cape contributed 7.0% and 9.4% of workers to the workforce and yet they reported 0.2% of injuries each. However, adjusted analysis indicated that only Free State, Kwazulu Natal and Mpumalanga were associated with incidence of injury making workers 50%, 27% and 27%

more likely to sustain injuries respectively compared to Western Cape. Probably the differences are based on variation of occupations by provinces. Residential instability could also contribute to higher likelihood of sustaining injuries if the workers are migrants from their home provinces which would concur with the findings among youth workers in Ontario (2).

As for association of incidence of injury with duration of work, only 4-8 and 9-16 years working durations increased the likelihood of workers sustaining injuries by 36% and 38% respectively. Probably this is influenced by correlation (r=0.42) between age and duration of work. After controlling for age, the likelihood of sustaining injury was higher for those who had worked for 4-8 years (AOR=1.39) and 9-16years (AOR=1.51) compared to those who had worked for 0.17-3 years.

After controlling for the socio-demographic variables, adjusted odds ratios (AORs) of some occupational variables changed or lost their significance, indicating that socio-demographic variables were to a certain extent confounders.

As regards occupations and occupationally related characteristics, adjusted analysis indicated that injuries were associated with the following economic activities own business, paid job, domestic work , casual work, as well as working with no written contract, no pension contribution and no paid leave. Not working in own business, paid job, non-domestic work and casual work reduced the likelihood of sustaining an injury by 14%, 68%, 58%, and 66% respectively compared to their counterparts (owning business, unpaid job, domestic work and permanent employment). The unpaid job workers are mainly those that work at home or in family own businesses. It is however, intriguing, that working at home and on permanent basis raises the likelihood of sustaining injuries 58%, and 66% respectively. While no immediate explanation for injuries among those working at home can be given, permanent workers may have more secure employment with written contracts and medical aid. The threat of loss of work if injured may cause casual workers to take extra precautions against occupational injury compared to permanent workers.

In terms of categories in main industry, eleven sub sectors were included in the analysis. Adjusted analysis established association between incidence of injury with mining and quarrying (AOR= 2.2), finance, insurance and business services (AOR=0.41) and working in private households (AOR=0.38). The reported increased likelihood association between injuries associated with mining and quarrying concurs with reports from a case control study in Taiwan where workers employed in mining and quarrying had an odds ratio of 2.7 of being injured compared to the control group(24). Compared with other main occupations, there is no association between incidence of injuries and domestic work.

Among the ten sub-sectors of main occupation, only three were associated with injuries, namely; crafts and related trade (AOR= 4.0), plant and machine operators (AOR= 4.4) and elementary occupation (AOR= 2.7).

Examination of gender distribution by main occupation indicated that, these three sub-sectors are male dominated at 11.2%, 9.9% and 10.7% respectively (Table 4.4). As such the elevated likelihood of injury in theses three occupations could be influenced by factors that predispose males to more injuries.

5.2 CONCLUSION

This study attempted to determine association between injuries and occupation at the general population level.

Despite the limitations aforementioned, the study findings supported the alternative hypotheses that there was an association between incidence of injuries and predictors such as socio-demographic (age, gender, ethnicity and province of residence), economic activities, occupations and occupationally related characteristics.

In regards to socio-demographic, majority of workers were below 40 years with older workers more likely to sustain injuries compared to the younger workers.

Males were found to be 2.4 times more likely to sustain injuries than females. Among provinces Free State, KwaZulu Natal and Mpumalanga were found to have increased risk to worker injuries.

In respect to occupations, mining and quarrying, plant, and machinery operations had a higher likelihood of causing injuries than other occupations. Large proportion of workers (73%) who sustained injuries sought medical attention. This could be an indication of seriousness of injury and costs related to absenteeism and medical treatment.

Contrary to the expectations those with written contract, pension contribution, paid leave, were more likely to sustain injuries and than their counterparts (no written contract, pension contribution, paid leave).

Population – based data such as this study, may provide a model for improving surveillance of worker injuries and provide support for community oriented approaches in prevention of work-related injuries

5.3 RECOMMENDATIONS

Since labour force surveys are done twice a year in South Africa, they have the capacity to generate reliable information on burden and trends of worker injuries which are vital for workers' health surveillance.

It is therefore recommended that more analyses of these surveys be done in respect to injuries as a basis for surveillance and occupational specific interventions.

The study further recommends that, efforts be put in occupation-specific injury prevention programmes in areas such as mining and quarrying, crafts and trade, plant and machinery operations which have elevated risks to injuries.

Further research is required to clarify some of the study findings that were inconsistent with the literature. Case in point is increase in injury risk with increase in age of workers, as well as reasons for permanent employees having higher likelihood of injuries compared to casual workers.

Through this dissertation the researcher has learnt that, secondary data analysis has serious limitations arising from the fact that the researcher has no control over the data already collected. Some of the shortcomings of the questionnaire can not be rectified at the analysis level. For example in this study, economic activity, main occupation and main industry could not elicit the expected responses.

The writing and revision of the dissertation has improved my scientific writing skills and re-enforced theoretical knowledge acquired in the classroom. I have also learnt that the process of research requires passion and perseverance to complete.

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7. APPENDICIES

7.1 Questionnaire (Worker variables of the February labour force survey that were used in the secondary data included:

SECTION 1
DATA FILE: PERSON

1. *Unique number(UqNr)*
   Unique Household Number.
   NB: This was the unique household identifier which could be used to link data from the workers file with data on the same households from other files
2. *Person number(PersonNr)*
   Person(respondent) number within household
   Valid Range 1-26
   Note: Both *Uq Nr* and *Person Nr c*ould be used to link data from this file with data on the same individual from other files
3. *Province (Prov)*
   South African Provinces
   Valid range 1-9
   Values:
   1. Western Cape
   2. Eastern Cape
   3. Northern Cape
   4. Free State
   5. Kwazulu Natal
   6. North West
   7. Gauteng
   8. Mpumalanga
   9. Northern Province(Now Limpopo)

4. *Type of area (type)*
   Valid range 1-2
   values:
   1. Urban
   2. Non-urban (rural)

DATA FILE: WORKER

1. *Unique number of the Respondent (uqNr) valid was 1*
This was the unique household identifier which could be used to link data from the workers file with data on the same households from other files.

2. *Person Number(Person Nr)*
Person (respondent) number *Valid range was 1-21.*
Both *Uq Nr* and *Person Nr c*ould be used to link data from this file with data on the same individual from other files.

3. *Gender*
Is .... A male or female
Valid range 1-2

4. *Age*
How old is----? (In *complete years, less than 1 year =0)*
Valid range 015-65

5. *Race*
What population group does …. Belong to?
Valid rabe 1-5
Unspecified: 9

SECTION 2
This section was only asked to people aged 15 years and above

1. *Person Responding(Q20SelfR)*
Does the person himself? herself responding to the question?
Valid 1-2
Unspecified : 9

2. *Own Business (Q21aOwnB)*
Run or do any kind of business, big or small for himself/herself?
Valid 1-2
Unspecified :9

3. *Paid work (Q21b bPaid)*
Do any work for a wage, salary commission or any payment in kind?
Valid 1-2
Unspecified: 9

4. *Domestic work(Q21cDome)*
Do any work as a domestic worker for a wage, salary, or any payment in kind?
Valid 1-2
Unspecified: 9

5. *Unpaid work (Q21dUnPa)*
Help unpaid in a family business of any kind?
Valid 1-2
Unspecified: 9

6. *Farm work (Q21eFarm)*
Do any work on his/her own or family's plot, farm, food grade, cattle post or kraal or help in growing farm produce or in looking after animals for the household?

Valid 1-2
Unspecified: 9

7. *Construction or major repair work(Q21fCons)*

Do any construction or major repair work on his/her own home, plot, cattle post or business or those of family?

Valid 1-2
Unspecified: 9

8. *Catch food (Q21gCtch)*

Catch any fish, prawns, shells, wild animals or other food for sale or family food?
Valid 1-2
Unspecified: 9

9. *Beg for money for food (Q21hBeg)*

Beg for money or food in public?
Valid 1- 2
Unspecified: 9

SECTION 4

This section was asked to all persons 15 years or above who were working or absent from work in the past seven days.

1. *Industry Activity(Q42Indus)*

What is the name of ….. 's place of work?
Valid 010-990
Not applicable: 888

2. *Year Commenced working(Q44NrEmp)*

When did…. Start working with the (main) employer ment?
Valid 1939-2001
Not applicable: 8888
Unspecified: 9999

3. *Month commenced working(Q45bMnth)*

When did…. Start working with (main) employer?
Valid 1-12
Not applicable: 88
Unspecified: 99

4. *Written Contract (Q48Wrttn)*

Does…. Have any written contract with the employer?
Valid 1-3
Not applicable: 8
Unspecified:9

5. *Supervision work (Q49Super)*

Does anyone directly supervise the work… does or doe he/she work independtly?
Valid 1-3
Not applicable: 8
Unspecified: 9

6. *Contribution to pension or retirement fund(Q411Pens)*

Does… 's Employer contribute to any pension/ retirement fund?
Valid 1-3
Not applicable: 8
Unspecified:9

7. *Paid leave (Q412Leav)*
Does… get any paid leave?
Valid 1-3
Not applicable: 8
Unspecified: 9

8. *Total salary paid (Q415aSal)*
What is ….'s total salary /pay at his/her main job?
Valid 0000001-2000000
Not applicable: 8888888
Unspecified: 9999999

9. *Sector (Q418sect)*
Is the organisation/ business/enterprise/branch where …works?

Valid 1-3
Not applicable: 8
Unspecified: 9

10. *Injured while doing economic activity (Q424_Inj)*
Has …… in the past 12 months been injured while doing any of the economic activities mentioned earlier?
1 = YES
2 = NO
3 = DON'T KNOW
Valid 1-3
Not applicable: 8
Unspecified: 9

11. *How many times has …… been injured due to work in the past 12 months?*
1 = 1 TIME
2 = 2 TIMES
3 = 3 TIMES
4 = 4 TIMES
5 = 5 OR MORE TIMES
6 = DON'T KNOW
Valid 1-6
Not applicable: 8
Unspecified:9

Did …… injuries cause him/her

12. *To stay in bed or at home for a day or more (Q426Stay)?*
Valid 1-2
Not applicable: 8
Unspecified:9

13. *To seek medical attention of any type? (Q426Medi)*

Valid 1-2
Not applicable: 8
Unspecified: 9

14. *To have pain for more than one week? (Q426Pain)*
Valid 1-2
Not applicable: 8
Unspecified: 9

15. *To have any permanent or long-term disability? (Q426Disa)*
Valid 1-2
Not applicable: 8
Unspecified: 9

16. *What was the major cause of the most serious injury? (Q427MrSN)*
1 = Machinery or tools
2 = A fall or something falling
3 = A person
4 = An animal
5 = Other, *specify*
6 = DON'T KNOW
Valid 1-6
Not applicable: 8

7.2 : Ethical Clearance Certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Kinoti

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER M081043**
PROJECT	Association between Injuries and Occupational exposures in South Africa: An Epidemiological Community Based Study
INVESTIGATORS	Ms MK Kinoti
DEPARTMENT	School of Public Health
DATE CONSIDERED	08.10.31
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 08.11.03 **CHAIRPERSON** .....
(Professor P E Cleaton Jones)

*Guidelines for written 'informed consent' attached where applicable

cc: Supervisor : Dr D Kielkowski

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES