RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS AND CARDIOVASCULAR DISEASE IN BLACK SOUTH AFRICANS LIVING IN A RURAL AND AN URBAN COMMUNITY

A mini-thesis submitted in partial fulfillment of the requirements for the degree of Masters in Public Health at the School of Public Health, University of the Western Cape.

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NOVEMBER 2012

Ten Keywords:
Socio-economic indicators

Cardiovascular disease

Non-communicable diseases

Prevalence

Risk factors

Black South Africans

South Africa

Rural

Urban

Cohort studies

DECLARATION

I declare that "*Relationship between Socio-economic status and cardiovascular disease in Black South Africans living in a rural and an urban community*" is my own work, that it has not been submitted before for any degree or examination in any other University and that all the sources I have used or quoted have been indicated and acknowledged as complete reference.

Name: Bonaventure Amandi Egbujie November 2012

Signed…….

ACKNOWLEDGEMENTS

I wish to thank God Almighty for making this dream a reality. A special appreciation goes to my supervisor Dr. Ehimario Igumbor for his support and guidance from the beginning of the MPH programme through to the completion of this work. I will like to thank the PhD coordinator, SOPH; Prof Thandi Puoane for her encouragement and moral support making sure that I had all that was needed to make this work possible. I acknowledge the wonderful role played by Ms Lungiswa Tsolekile during the course of the programme, Ms Corinne Carolissen and Ms Janine Kader for their willingness to accommodate my various requests even when difficult. I wish to thank my uncle; Mr Dominic Egbujie, brother; Cajetan Egbujie and sister; Nkiru Okereke for believing in me. Lastly I wish to dedicate this work to my late parents, Mr Christopher Egbujie and Mrs Agnes Egbujie.

LIST OF ABBREVIATIONS AND ACRONYMS

AOR	Adjusted Odds Ratio
AIDS	Acquired immune deficiency syndrome
BMI	Body Mass Index
CSDH	Commission on Social Determinants of Health
CVD	Cardiovascular disease
HIV	Human immunodeficiency virus
MPH	Masters in Public Health
PURE	Prospective Urban and Rural Epidemiological study
SA	South Africa
SADHS	South African Demographic and Health Survey
SES	Socio-economic status
SOPH	School of Public Health
UWC	University of the Western Cape
WHO	World Health Organisation

Table of Contents

Contents **Page number**

LIST OF TABLES AND FIGURES

List of Tables

List of figures

ABSTRACT

Relationship between Socio-economic status and cardiovascular disease in Black South Africans living in a rural and an urban community

Introduction: In recent years, cardiovascular disease (CVD) has emerged as a leading cause of death in developing countries. It is important to identify and target people who are at risk, given that a third of all deaths are expected to be due to CVD by 2020. Studies have shown socio-economic patterning in the prevalence of risk factors for CVD, including obesity, smoking and lipid profile. In developed countries, the association between socio-economic status (SES) and CVD risk factors is negative, with a higher prevalence of CVD risk factors among people of lower SES. However, findings from studies in developing countries on this including South Africa has been inconsistent. In addition, there is scant information on differences in socio-economic patterning of CVD risk factors between urban and rural areas in South Africa.

Aim: To examine the association between SES indicators and CVD risk factors among an adult population cohort of Black South Africans living in a rural and urban community.

Study design: Quantitative cross-sectional analytical study of baseline data of a population-based cohort of 2000 Black South African men and women aged 30-70 years who are part of the Cape Town arm of the Prospective Urban and Rural Epidemiology (PURE) Study. The study cohort has been established in Mount Frere, Eastern Cape (rural) and Langa, Cape Town (urban) since 2009 and the current work is secondary analysis of the baseline study data.

Data collection/synthesis: SES indicators including income, employment status, marital status and completed education were gleaned from the baseline data of the PURE Cape Town study for all study participants. Then CVD risk factors including obesity, hypertension, self-reported diabetes, consumption of tobacco and alcohol consumption were also determined for the same participants.

Data analysis: Data was analysed using SPSS version 20 for Windows. Descriptive statistics including frequency counts, percentages, mean and standard deviations (where normal

distribution) and median and interquartile range (where non-normal) were used to summarise data on SES and CVD risk factors. This was performed separately for rural and urban study participants. Analytical statistics was used to examine associations between SES indicators and CVD risk factors with risk factors as both dichotomous and multi-level categorical variables. Kendall's τ rank correlation coefficient was obtained to assess the relationship between the three indicators of SES. Prevalence rates reported with 95% confidence intervals was determined for risk factors across categories of SES indicators. *P*-values for trends in CVD risk factors were obtained by treating the SES indicators as categorical variables in logistic regression analyses. Multiple logistic regression analysis to estimate independent effects of the different SES indicators on risk factors was performed. In all analyses, *P*-values < 0.05 were regarded as significant.

Results: There was a significant difference in the socioeconomic and CVD risk factors profile of urban and rural participants. Except for hypertension and tobacco use with insignificant higher prevalence in the urban location, all CVD risk factors were significantly higher in urban than rural participants. Some CVD risk factors (hypertension and diabetes) were positively associated with high SES (income) and some others (tobacco use) were negatively associated with employment status. Highest income earners had the highest risk of hypertension (AOR= 2.4, 95% CI 1.5-3.9) and diabetes (AOR= 2.2, 95% CI 1.2-4.1) after adjusting for age, sex and other SES variables. Marital status however showed the most consistent association across all CVD risk factors; widowed participants had a high risk of hypertension (OR=2.1, 95% CI 1.2-3.7) and diabetes (OR=2.0, 95% CI 1.1-3.7), but had the lowest risk of tobacco (OR=0.3, 95% CI 0.14-0.66) and alcohol use (OR=0.3, 95% CI 0.15-0.72). The distribution of CVD risk factors by SES gradient showed inconsistent patterning and difference between the urban and rural participants.

Conclusion: In this cohort of adult Black South Africans, high income earning and widowed marital status were associated with higher hypertension and diabetes prevalence, while unemployment was associated with higher tobacco use.

Recommendations: CVD risk reduction interventions that recognise the differential susceptibility of individuals in different SES group need to be designed and implemented**.**

Widows and widowers should be given focussed attention in health screening as they may have increased vulnerability to diseases especially CVDs. There is however need for more research to establish the pathway through which SES factors predispose or protect individuals from CVDs.

CHAPTER 1: INTRODUCTION

1.1 Background and rationale

Cardiovascular disease (CVD) has emerged as one of the leading causes of death globally with reports indicating increasing morbidity and mortality from CVDs. It accounts for as much as one third of all deaths in some countries. CVD is a massive health problem worldwide but with significant impact especially in developing countries. Amplavanar, Gurpreet, Salmiah & Odhayakumar (2010: 166) noted that in 2003, CVD was responsible for 29.2% (16.7 million) of all deaths globally climbing quickly to 30% (17.5 million) in 2005, and this is expected to rise to 20 million deaths by 2015. The World Health Organisation (WHO) through its yearly publication lend further credence to the above assertions stating that an estimated 23.6 million people will die from CVD alone by the year 2030 from current projections and CVD will become the leading single cause of death worldwide (WHO, 2011: 1).

CVD is usually triggered by the presence of one or more traditional predisposing factors which includes but not limited to hypertension, obesity, cigarette smoking and unfavourable lipid profile. Countries where CVD mortality have been reported to be high or on the rise have equally been documented to have high prevalence of CVD risk factors almost in tandem with reported increased CVD mortality. van Zyl, van der Merwe, Walsh, van Rooyen, van Wyk & Groenewald (2010: 74) showed in a study on risk factors of chronic lifestyle diseases in South Africa that 63.1% and 55.8% of their study participants were hypertensive and obese respectively, two of the commonest CVD risk factors. This coincides with the noted mortality from CVD in South Africa in recent times according to National mortality statistics, CVD, diabetes, respiratory diseases and cancer were responsible for 12% of all disease burden (Mayosi, Flisher, Lalloo, Sitas, Tollman & Bradshaw 2009: 935). In their study in Malaysia, Amplavanar *et al* (2010: 167) found that overall, more than 86% of their study respondents had at least one CVDs risk factor, commonest of which was obesity, occurring in at least 62.6% of respondents.

That prevalence of CVD risk factors has been high and rising in most countries worldwide is no longer in doubt but the patterns of distribution of these risk factors between different

geographical, ethnic, social and cultural divide both between and within countries remains subject of research. While studies conducted in developed world report higher prevalence of CVD risk factors among people of lower social status, several studies conducted in developing countries report higher prevalence of CVD risk factors among people in the higher social standing. Mathenje, Foster & Kuper (2010) in a study conducted in Kenya showed that the prevalence of Hypertension and Diabetes Mellitus were higher in the urban compared to rural areas. Based on the premise that in a developing country like Kenya, urban dwelling is associated with better living conditions (higher SES) compared to rural settlement, it can be deduced that CVD risk factors are more common among people in the higher SES. In their own study conducted in Ghana, Addo, Smeeth & Leon (2009) also showed that hypertension (one of the CVD risk factors) was more prevalent in people of higher SES. However in their study in China, Yu *et al* (2000) concluded that CVD risk factors are more prevalent among people in the lower SES group. In Dar es Salam Tanzania, a similar study found that SES varied inversely BP and smoking (high prevalence in low SES) but directly with BMI (Bovet, Ross, Gervasoni, Mkamba, Mtasiwa, Lengeler, Whiting & Paccaud 2002). These examples reflect to some extent much of the variations in distribution of CVD risk factors reported between countries.

In South Africa, the prevalence of CVD risk factors and mortality from CVDs have been studied by researchers and monitored by relevant authorities with reports showing similarities to prevalence and mortality trends reported from other parts of the world (Mayosi *et al* 2009 ; Statistics SA 2011). Statistics SA reported that, CVDs and Diabetes now rank among the top ten causes of mortality in the country only behind Tuberculosis, Intestinal infections, Respiratory tract infection and HIV/AIDS (Statistics South Africa, 2011). It is also reported that the country is presently in what is termed "epidemiological transition" - moving from a period where there are more deaths and illnesses from infectious diseases to the period where there is growing morbidity and mortality from chronic non-communicable diseases such as CVDs, cancer and so on (Mbewu, 2009). According the 2007 statistical factsheet update published by the American Heart Association, it is estimated that the number of years of productive life lost in South Africa between 2000 and 2030 will be 28years on the average due to CVDs. With the HIV/AIDS scourge further reducing life expectancy of the population, these two conditions will double the tragedy of excessive mortality and disease burden if no further interventions are instituted. Indeed some experts have reported that the country is undergoing a "bi-polar

epidemiological transition" meaning that not only is the country moving into a period of increased mortality from chronic non-communicable diseases but that communicable diseases such as HIV/AIDS are still major causes of mortality.

Increased prevalence of CVD risk factors among the different population groups in South Africa have been studied and attributed to factors of lifestyle, urbanisation and affluence by several researchers. Available studies offer cursory analysis of the association between socioeconomic factors such as education, income or marital status and CVD risk factors. Thorogood, Connor, Tollman, Hundt, Fowkes & Marsh (2007) and Alberts, Urdal, Steyn, Tverdal, Nel & Steyn (2005) in their separate studies found smoking, diabetes, obesity, and alcohol use as risk factors for CVD while scarcely mentioning the role of socioeconomic factors. This could be misleading and may take policy makers and health care providers' attention away from the full continuum of factors that work either singly or in combination to accentuate CVDs and especially the role of socioeconomic factors could continue to be ignored to worse effect.

The last statement above is essentially important because it is known that people's experience of health or disease flow directly from their social resources and circumstances (Commission on Social Determinant of Health, 2008). There is a known inverse relationship between SES and overall health status of a population. Lynch, Kaplan, Cohen, Tuomilehto and Salonen (1996: 934) stated in a study looking at the relationship between SES and risk of mortality from CVDs that, "with few exceptions, this [inverse] association exists regardless of the measure of SES that is employed or the health outcome studied".

Reports on the exact association between SES and CVD risk factors however remain inconsistent across different regions and countries of the world. While the prevalence and mortality trend of CVD risk factors in South Africa have been studied and reported to closely resemble that of most other countries (Vorster, Kruger, venter, Margretts & Macintyre, 2007), the association between SES and CVD risk factors have received very limited attention as reflected by the paucity of literature on this topic. Vorster *et al* (2007) reported that in the THUSA study, groups with the highest SES had lower prevalence of CVD risk mirroring reports from other developed countries, but importantly, they equally added that this

distribution is expected to change sooner due to the observed nutritional transition among the study population.

The need to establish with reasonable accuracy the exact nature of the relationship between SES and risk of CVD cannot be more important for any other country than it is for South Africa. With long history of social inequality, huge disparity in income as well as wealth distribution and the consequent implications on the overall health status this relationship cannot be overlooked. The vexing question is therefore: "what is the relationship between SES and CVD risk factors among Black South Africans living in different locations?" Answering this question is important to identifying people who are at most risk and thus appropriately informing interventions to control the emerging epidemic of CVD.

1.2 Problem Statement

The Black African population group makes up about 79.2% of the 2011 South African population (Statistics South Africa, 2012). "Black" in the context of this study is used to refer to South Africans of "African" origin and excludes the Coloured and Asian groups also referred to as Black in the affirmative action policies. Unfavourable SES is usually aligned with more people in this population group. Consequently, any disease of high morbidity and mortality such as CVDs with proven social determinants will affect this group differentially and will in turn impact negatively on the overall health status of the country since they constitute the majority of the population unless appropriate interventions are instituted. Such interventions can only be designed if the different factors associated with or contributing to the development of CVD are adequately delineated. Regrettably, information on the relationship between SES and risk of CVD in South Africa and especially among Black still remains very limited.

Evidence from available studies has shown socio-economic patterning in the prevalence and distribution of CVD risk factors, including obesity, smoking and lipid profile. In developed countries, the association between socio-economic status (SES) and CVD risk factors is reportedly inverse, with a higher prevalence of CVD risk factors among people of lower SES. However, the evidence from developing countries, including South Africa, has been inconsistent showing different distribution in different countries. Aside this variation noted in developing countries, there is paucity of information on the differences in socio-economic

patterning of CVD risk factors between urban and rural areas in South Africa as in many developing countries.

The current study examines the relationship between socioeconomic factors and risk of cardiovascular disease among adult Black South Africans.

1.3 Original Study Context – the Prospective Urban and Rural Epidemiology (PURE) study

The Prospective Urban and Rural Epidemiology (PURE) study is a multi-country cohort study to track changing lifestyles, risk factors and chronic diseases in different population groups (Teo, vaz, Rangarajan & Yusuf, 2009). The University of the Western Cape's School of Public Health co-ordinates this investigation in the Eastern and Western Cape Provinces of South Africa (Igumbor, Puoane, Tsolekile, Muzigaba and PURE Cape Town investigators, 2010). The main objectives of PURE study in South Africa are: "(i) to examine the relationship between societal influences and prevalence of risk factors and chronic non-communicable diseases; (ii) to examine the relationship between societal determinants and incidence of chronic non-communicable disease events and on changes in rates of selected risk factors".

Utilizing periodic standardised data collection methods, the environmental changes, the societal influences on lifestyle, the risk factors and CVD are being tracked (Igumbor *et al*., 2010). 2000 Xhosa-speaking adult (30-70 years) male and female participants have been recruited from an urban (Langa, Cape Town) and rural (Mount Frere, Eastern Cape) community and have undergone detailed baseline assessments in 2009 and 2010. Data collection incorporates the societal determinants of the built environment, nutrition environment, tobacco use and socioeconomic/ psychosocial determinants. Specific measurements include physical examination of blood pressures, anthropometry (weight, height, skin fold, waist and hip circumferences), electrocardiography, muscle strength using hand grip dynamometer, lung function test using a spirometer, blood and urine analysis including of glucose and lipids. Participants also complete questionnaires including a food frequency questionnaire, physical activity questionnaire medical and social history (including data on tobacco and alcohol use), and a household questionnaire (including data on income and household possession).

The choice of study settings for establishing the cohort was deliberate. The rural setting - Mount Frere is inhabited predominantly by Xhosa-speaking Black Africans with widespread low socioeconomic conditions. The urban setting – Langa is equally inhabited predominantly by Xhosa-speaking Black Africans but with a presumably better socioeconomic situation compared to the rural area largely due to its proximity to a large city, Cape Town. Conducting the study in both rural and urban population provides an opportunity to assess the type of relationship that exists in different types of locations rather than that between different socioeconomic (Igumbor *et al*., 2010).

1.4 Aims and Objectives

1.4.1 Aim

Using the established population-based cohort of the PURE Cape Town study, to determine the relationship between socioeconomic factors and risk of cardiovascular disease in Black South Africans in both an urban and rural population and analyse the difference in this relationship in the two settings.

1.4.2 Objectives

1. To describe the socioeconomic characteristics of adult Black South Africans in the urban and rural arm of the PURE Cape Town study
2. To determine the prevalence of cardiovascular risk factors in the above study population
3. To determine the distribution of CVD risk factors in the urban and rural population group according to socioeconomic status
4. To compare the prevalence and distribution of CVD risk factor according to socioeconomic status of urban and rural populations.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter focuses on the prevalence of CVD risk factors, socio-economic situation in South Africa, relationship between these risk factors and socioeconomic status as well as their distribution in different countries and population groups. The review also looks at trends of the relationship in different economic settings globally in a bid to contextualise the South African situation more appropriately.

2.2 Prevalence of CVD risk factors

Prevalence of CVD risk factors in different population groups have been the subject of various studies carried out across the globe with varying results. CVD risk factors include traditional metabolic risk factors such as Hypertension, Obesity, Diabetes Mellitus and Dyslipidaemia as well as behavioural factors such as excessive alcohol intake and smoking. Reports suggest pervasive presence of these risk factors among people of various ethnic and socio-cultural backgrounds and estimate is that they will be among the most prevalent public health issues in a few years to come.

According to the WHO, "the number of smokers in the world, estimated at 1.3 billion, is expected to rise to 1.7 billion by 2025 if the global prevalence of tobacco use remains unchanged" (WHO World Health Report, 2003: 92). Smoking have been established as one of the preventable leading causes of death worldwide responsible for significant amount of deaths in millions a year. It is important to add at this point that most of these deaths are recorded in developing countries to which South Africa belongs. Since smoking has been established as one of the major risk factors for CVD, this estimate represents a huge burden for health authorities everywhere in the world. Weighed against the backdrop of projected mortality and mortality from complications arising as a result of smoking, this figure is of significant public health concern. This concern is made even more grievous if one considers that the WHO has reported that by 2020, tobacco is expected to be the single greatest cause of death and disability worldwide, accounting for about 10 million deaths per year (WHO, 2010). In Sweden, Peltonen, Huhtasaari, Stegmayr, Lundberg and Asplund (1998: 5) reported that 45% and 29%

of men and women respectively used one form of tobacco or the other and in the African component of the Interheart study, it was reported that 56.3% control and 72.3% of cases was either a current or past smoker. Also using data from the Heart of Soweto study, Sliwa, Wilkinson, Hansen, Ntyintyane, Tibazarwa, Becker & Stewart (2008: 918) reported that 41% of all study participants had a history of smoking. Considering the current and projected mortality and related complications from tobacco use, this reported prevalence across different continents calls for serious concern. To make this much more contextual, it was reported that in South Africa that, tobacco users die of various diseases before their time, but most die because of CVD (Groenewald, Vos, Norman, Laubscher, van Walbeek, Salooje, Sitas & Bradshaw 2007).

Another traditional metabolic CVD risk factor with very high prevalence reported across the world is obesity. The WHO estimates that if current trends continue, the number of overweight people globally will increase to 1.5 billion by 2015 (WHO, 2005). Alberts *et al* (2005: 349) reported that in a South African Black population living in rural Limpopo, approximately 59% of women and 29% of men who participated in their study were either obese or overweight. Puoane, Steyn, Bradshaw, Laubscher, Fourie, Lambert & Mbananga (2002) also found very high prevalence of obesity among Black women (central obesity in up to 42.2%). In 1998, 56% of women and 29% of men, aged 15 years or older in South Africa were overweight or obese and these high rates had not changed by 2003 (Heart and Stroke Foundation of South Africa, 2007). Obesity is also known to have very strong association with the development various chronic diseases including CVDs.

As is the case in developing countries such as South Africa, developed countries also have problems with obesity. In a study conducted among fire-fighters in New York City, USA; Smith, Fehling, Frisch, Haller, Winke, & Dailey (2012: 269) reported that 51.7% of the study participants were found to be obese. This reported prevalence are very significant if the documented impact of obesity on overall disease conditions but especially CVD is to be taken into consideration.

Elsewhere in India which has almost a similar economic profile with South Africa, reports suggest that there is increase in the prevalence of all major CVD risk factors (Samuel *et al* (2012; Gupta *et al* 2012). In the last 30 years, the prevalence of hypertension and

hypercholesterolemia has doubled while that of diabetes has trebled (Gupta, Guptha, Sharma, Gupta and Deedwania, 2012: 117). This goes to support the fear already expressed by many that CVD will emerge as the leading cause of death worldwide in the near future if current trend is not halted.

Many other authors have studied prevalence of CVD risk factors among South Africa populations with results showing significant levels of risks. van Zyl *et al* (2010: 75) examined the risk factor profile for chronic lifestyle diseases in three rural Free State towns and found that cumulatively, 35.6% and 21% of the study population had two and three risk factors respectively. Some of the risk factors identified in their study which includes smoking, obesity, hypertension and dyslipidaemia are known to be strongly associated with CVD.

In the Heart of Soweto study in a Black urban population, the researchers found that 59% of study participants had several CVD risk factors, a result that reflects high prevalence in this population group (Sliwa, *et al*, 2008). Alberts *et al*. (2005) in a study of rural Black population in Limpopo found that there is a high prevalence of CVD risk factors among Black population and that by using the Framingham's formulae, (a scoring system used to determine the risk of developing CVD in ten years for individuals utilising the various risk factors the individual has), 18.9% of women and 32.1% of men have a 20% or higher chance of having a CVD in the next ten years. However, it is good to be cautious in interpreting the above findings since response rate in the study was below 50% of intended responders and among this, almost 75% were women. This could be a potential source of error as the gender ratio is not representative of the ratio in the target population.

Although the prevalence of these factors have been established all over South Africa, reasons for their occurrence and or increase in recent times have been subject of discussions and research but with limited literature to adequately establish why. Some studies while trying to give reason for this prevalence seem to have focussed attention on urbanisation, affluence and lifestyle modification.

However for most of the study discussed so far, information on the distribution of CVD risk factors according to SES was not explicitly stated making it impossible to assess the association

or influence of socioeconomic conditions on the prevalence and risk of CVD in this population group.

The paucity of research on the relationship between socioeconomic factors and CVD risk factors could either be because socioeconomic factors are not a major concern in the country or it is the thinking of researchers that socioeconomic factors are not involved to any reasonable extent in the development of CVDs. Could this be true? The next section will try to provide some insight into the question and possible answer.

2.3 Socioeconomic situation in South Africa

The significance of socioeconomic factors in health was highlighted in the WHO publication on the findings by the Commission on Social Determinants of Health (CSDH). "Even within countries, there are dramatic differences in health that are closely linked with the degrees of social disadvantage" (CSDH, 2008:1). That socioeconomic factor could and have had effect on the development of CVD risk factors in South Africa will be better appreciated if we take a look at the social epidemiology of the country.

Income and wealth distribution in South Africa is known to be among the most unequal in world. May (2000: 2), stated that, "in *per capita* terms, South Africa is an upper middle-income country, but most households experience outright poverty or vulnerability to being poor". The author equally pointed out that though this poverty is not restricted to any racial group, it is concentrated among the Black population 61% of whom she said are poor. The above assertions imply a concentration of low socioeconomic condition among the Black group. Meyer, Susser & Erhlich (2004: 119) reported that, "much of the patterning of health, poverty, and race observed in contemporary South African society is the result of the enduring effects of social, political, and economic discrimination".

In South Africa just as in most other countries, socioeconomic factors play a key role in determining population health albeit in a complex way. The situation in the country is made more significant considering the huge disparity in the wealth distribution and socioeconomic conditions of the over 45 million citizens. For instance, "The national Gini coefficient for income inequality (0.58) demonstrates the second-highest level of inequality among all

countries worldwide" Meyer, Susser & Erhlich (2004: 115). For a country with a long history of social inequality, ignoring the impact of socioeconomic factors on the risk of CVD while promoting urbanisation and lifestyle as major causes will appear preposterous and could delay or stifle meaningful progress towards tackling this new epidemic if indeed significant relationships exist between these two conditions. It is obvious from the above assertions that socioeconomic conditions are definitely issues of major concern in South Africa. However the pertinent question to be addressed is whether and how these socioeconomic factors relate to CVD risk factors.

2.4 Socioeconomic status and CVD risk factors

CVD risk factors appear to be related and are influenced by certain social factors including socioeconomic situation. Anand, Razak, Davis, Jacobs, Vuksan, Teo & Yusuf (2006), studied the relationship between social disadvantage (as marked by low socioeconomic status) and cardiovascular risk factors among different ethnic groups in Canada. They found that apart from the traditional risk factors (such as hypertension, smoking, obesity), socioeconomic status influenced the development of CVD, with the suggestion that increased social disadvantage was associated with increased burden of CVD.

This inverse relationship observed between socioeconomic status and CVD risk factors in the above study have been corroborated by several other studies in developed countries. Yu *et al* (2000) in a similar study in an urban population in China, reported educational level as the most significant predictor among all socioeconomic factors of the risk of CVD among study participants and that there is an inverse relationship between CVD risk factors and socioeconomic profile, comparable to relationships seen in studies carried out in developed countries. "Socio-economic stressors are also increasingly being recognized as major contributors to cardiovascular risk" (Belue, Okoror, Iwelunmor, Taylor, Degboe, Agyemang & Ogedegbe 2009:10)

Across the developed world, studies consistently indicate that CVD risk factors align more with people of low SES (Lynch, *et al* 1996; Beauchamp, Peeters, Wolfe, Turrel, Harris, Giles, English, Mcneil, Magliano, Harrap, Liew, Hunt & Tonkin 2010). In developing countries however, there are mixed results on the relationship between socio-economic factors and risk

for CVD. In a study in India, results showed a positive correlation between socioeconomic factors and risk of CVD (Samuel, Antonisamy, Raghupathy, Richard & Fall 2012). This represents a deviation from the situation in developed countries.

Mathenge *et al* (2010) in a population based survey looking at ethnicity, urbanisation and CVD risk factors in a population in transition in Kenya found that CVD risk factors were very common among the study population and that they were more so in an urban compared to a rural population. The study also showed that there were more educated and higher income earners among the urban population which tends to imply that there is a positive relationship between socioeconomic status and CVD risk factors in the country. Although more people in the urban compared to the rural population had these CVD risk factors, the study did not present the distribution of CVD risk factors according to socioeconomic status in each of the study setting. Therefore, it may not be completely correct to conclude on the basis of their study alone that higher SES in Kenya was associated with higher risk of CVD as suggested in this study.

In another study in Argentina examining the socioeconomic gradient in chronic disease risk factors and the effect of urbanisation, Fleischer, Diez Roux, Alazraqui, Spinelli & de Maio (2011) reported that the socioeconomic gradient in chronic disease (including CVDs) factors differed between a rural and an urban population. They found that while a higher socioeconomic status was associated with chronic disease risk factors in the urban areas, an inverse relationship existed in the rural area with more people in the lower socioeconomic status having more of the chronic disease risk factors.

This type of relationship was also demonstrated by another study in India which reported varying patterning in the distribution of CVD risk factors between urban and rural locations. Gupta, Guptha, Sharma, *et al* (2012) reported that in seemingly less developed regions of India, CVD risk factors were more prevalent among urban population compared to the rural whereas in the more developed regions, there were no significant difference in the distribution of CVD risk factors between urban and rural populations.

It does appear therefore that even within a country, differences exist in the relationship between SES and CVD risk factors between location types. Urbanisation (growth of a place from that of more rural area with few people to one with higher population and more urban setting) according to this study is responsible for this difference while SES takes the background. This finding is pertinent to the current study since South Africa with almost a similar economic profile to Argentina as a middle income developing country, is going through both economic and epidemiologic transition.

Gupta, Kaul, Agrawal, Guptha & Gupta (2010) found that people of low and middle educational status have higher risk of CVD in a study carried out in India. The appearance of more risk factors in middle educational status is an indication of a population in transition (Gupta, Kaul, Agrawal, *et al*, 2010). Although India is a developing nation, it is argued by the authors that the epidemic in the country has reached an advanced stage and therefore the epidemiology will rightly resemble those seen in developed countries. This seems to suggest that different developing countries are at different stages in the CVD epidemic and that the socioeconomic distribution of CVD risk is dependent on the stage of the epidemic that a country is in. Although there is limited research assessing this relationship in South Africa, the situation should not be much different from that obtained from other middle-income countries with similar economic and epidemiologic transition. Determining the distribution of CVD risk factors according to socioeconomic status as well as the disparities between a rural and urban Black population are two of the objectives of this study. It is hoped that this will equally bring more sharply into focus the influence of urbanization on the prevalence and distribution of CVD risk factors.

All the studies reviewed in the previous paragraphs have highlighted the high prevalence of CVD risk factors in South Africa and tried to elicit the relationship between socioeconomic status and these risk factors in some developed and developing countries. The influence of socioeconomic factors on CVD risk appears not to have been given enough attention in the South African context despite a long standing history of social inequality in the country. With the country reportedly in a period of epidemiological and economic transition, and witnessing wide variation in the level of development between locations and population groups, a study of the relationship between socioeconomic status and CVD risk and the difference between rural

and urban population is essential to accurately spotlight the situation in the country. This hopefully will eventually feed into the design of appropriate policies that will ensure that the different locations and population groups are reached with appropriate intervention to reduce the CVD burden through improvements in their socioeconomic conditions.

CHAPTER 3: METHODOLOGY

3.1. Study Design

Quantitative cross-sectional analytical study of baseline data of a population-based cohort of 2000 Black South African men and women aged 30-70 years who are part of the Cape Town arm of the Prospective Urban and Rural Epidemiology (PURE) Study. The study cohort has been established in Mount Frere, Eastern Cape (rural) and Langa, Cape Town (urban) since 2009 and the current study is a secondary analysis of the baseline data.

3.2. Study Setting, Population and Sample

The PURE study is an on-going investigation of the relative contribution of societal influences on individual lifestyle choices and on risk factor of diabetes, obesity and CVD (Igumbor *et al.*, 2010). Participants for this study were selected from two communities of Black South Africans- Mount Frere, a rural community located in the Eastern Cape Province and Langa, an urban settlement close to Cape Town in the Western Cape Province. The communities were purposively selected on the basis of having a relatively stable (non-migratory) Black population for feasibility of follow-up in a prospective cohort study (Igumbor *et al*., 2010).

For the urban community (Langa), households were grouped into three development areas – "old Langa", "the Zones" and "the hostels", recognized administratively by the City of Cape Town and which mirror the socioeconomic status of the residents (old Langa considered higher SES and better established with amenities and the hostels the lowest SES). A street map obtained from the City of Cape Town was used to randomly select streets in each of the 3 areas. Once a street was selected, a systematic sample of every second house was approached for possible inclusion in the study. To be included, households needed to have at least one member who was aged 30-70 years. All households with eligible individuals were approached by trained field workers for recruitment.

All individuals who are usual residents were considered "household members" and eligible to be selected into the study. A "usual resident" was defined as one "who eats and sleeps in the household on most days of the week and in most weeks of the year and considers the place his

primary place of habitation" (Teo *et al*, 2009; Igumbor *et al*, 2010). The initial recruitment took place between April and August 2009 with close to 1000 participants recruited in both locations.

For the rural community (Mount Frere), the absence of streets precluded the possibility to follow the same sampling approach. A cluster sample of houses in the community was therefore undertaken according to the division of areas by the clan heads.
The sampling yielded 437 households in the urban community (with 1081 individuals) and 329 households in the rural community (with 1003 individuals).

All eligible recruited participants were used for the secondary analysis.

3.3. Data Collection

The PURE study utilised standardised interviewer administered questionnaires previously tested and used in a similar study, anthropometric measurements as well as blood sample collection for biochemical measurements. The questionnaires were used to capture information about socioeconomic factors, health status and history, lifestyle factors and were completed during home visits by trained field workers. Repeated visits at different times of the day to households where individuals were missed were used to reduce the level of non-response. Information on socioeconomic factors such as education, employment status, income and household assets as well demographic (age, sex etc.) and health history (hypertension, diabetes, etc) were also collected with the questionnaire.

For anthropometric and biochemical measurements, participants were invited to a convenient center (e.g. the community school premises or church) where trained research assistants carried out all physical measurements e.g.; height, weight, waist/hip ratio, blood pressure and collected blood samples. Reminders were sent out to participants on the evening of their physical measurement appointment date to ensure good response. Measurements were performed according to standard protocol. Blood pressure was measured using an OMRON 711 automated device with the appropriate cuff size for the measured mid-upper-arm circumference and after the subject had been seated at rest for at least 10 minutes. Two readings were made 3-4 minutes apart, re-applying the cuff for each, and the average of the two readings was used for the

definition of hypertension. Blood pressure measurements were taken on the left arm of each participant in a sitting position. Hypertension was taken as systolic blood pressure ≥140mmHg and or a diastolic pressure ≥90mmHg or anyone on antihypertensive irrespective of the blood pressure red. Plasma glucose and lipid levels were measured fasting (12 hour overnight). All these above will feed data on the socioeconomic status and cardiovascular risk factors to be assessed in the proposed study

Visits for anthropometric measurements and blood collection by participants were scheduled such that a manageable number of participants were attended to each of the study days and adequate arrangements made for specimen to be collected from them. Instruction was given to participants on how to carry out overnight fasting up till the time they visited the next day to ensure that fasting blood samples are collected from them. The fasting blood samples collected were then transported in icepacks (for preservation) within two hours to the nearest hospital facility where the blood samples were centrifuged within 3 hours of collection and essential tests such as fasting blood sugar, total and differential cholesterol (high density lipoprotein, low density lipoprotein, triglycerides) levels determined. This was essentially to meet the minimum variables required to calculate the Framingham's risk score of the study participants.

3.4. Variables

3.4.1 SES indicators

For the purpose of this study, four socioeconomic factors were assessed in the sample population; educational level, employment status, income and marital status. Educational level has been reported as most significant of all socioeconomic factors influencing the development of CVD risk (Yu *et al*, 2000). Education variables were recorded as one of four categories from "no schooling" (category 1, 0 years), primary school (category 2, 1-8 years), secondary school (category 3, 9-12 years) and post-secondary school (category 4, >12 years). Income group was graded according to total amount earned/accruing to an individual's household in a month into low (≤R900), medium (R901 – R1080) and high income groups (>R1080). This division was done arbitrarily by arranging all participants household income from smallest to the highest and then taking the lower quartile (<25%) as the lowest group, the inter-quartile (26 -75%) as the middle group while the upper quartile (>75%) was taken as the highest income group.

Marital status was recorded as single, married/co-habiting, divorced/separated and widowed.

3.4.2 CVD risks factors

Five major CVD risk factors were the focus of this study and they include obesity, tobacco use, hypertension, diabetes mellitus and alcohol consumption.

Body mass index (BMI) was calculated as weight (kg) divided by height (m) squared. BMI was categorized as underweight (<18.5), normal (18.5-24.9), over-weight (25.0 - 29.9) and obese (>30.0).

Hypertension was taken as systolic blood pressure ≥ 140mmHg and or a diastolic pressure ≥90mmHg and or self-reported diagnosis of hypertension and or use of anti-hypertensive drug regardless of BP reading during physical examination.

Diabetes was defined self-report of diagnosis of diabetes and or use of medication for diabetes. This was expedient because the random and fasting blood sugar results were not made available for this analysis.

Alcohol consumption was categorized into three groups as current drinker, former drinker and never. Tobacco consumption was categorized simply as current tobacco users, former users and never used.

3.5. Validity and Reliability of the study

The primary study applied a number of strategies to strengthen the study rigour and trustworthiness. Validated tools and approaches were applied in its data collection. This included following a standardized protocol, training of data collectors, repeat measurements, calibration of measuring devices, conducting interviews in the local language (Xhosa), pre-testing of all tools and several strategies of error checking of the data (Igumbor *et al*., 2010).

For the proposed study, a clear definition of the method of analysis has been detailed in this protocol. Classification of variables of SES indicators and CVD risks adheres to conventional norms.

3.6. Generalizability of study

PURE study cohort was established in only 2 communities and may therefore not fully represent all urban and rural communities in South Africa. Findings from this study may,

however, serve as the basis for further investigation. The use of the entire PURE study cohort in the proposed secondary analyses will allow findings to directly reflect the cohort.

3.7. Data Analysis

Statistical data analysis was performed using the SPSS software (version 20 for Windows). Univariate analysis was conducted on the socioeconomic variables and the CVD risk factor variables and was presented as means and standard deviation for continuous data and as percentages for categorical data to describe the frequency and distribution of each of the variables. Descriptive statistics which include frequency, percentage, mean and standard deviations (if normal distribution) and median and interquartile range (if non-normal) was used primarily to summarise data on SES and CVD risk factors. This was performed separately for rural and urban study participants. Analytical statistics was used to examine associations between SES indicators and CVD risk factors with risk factors as both multi-categorical and dichotomous variables. Kendall's τ rank correlation coefficient was obtained to assess the relationship between three of the four indicators of SES. Prevalence rates reported with 95% confidence intervals was determined for risk factors across categories of SES indicators. P-values for trends in CVD risk factors were obtained by treating the SES indicators as categorical and continuous variables in logistic regression analyses. The categories applied for analysis were as follows:

SES

- Educational level- 1. None 2. Primary 3. Secondary 4. Post-secondary
- Marital status- 1. Single 2. Married/co-habiting 3. Widowed 4. Divorced/separated
- Employment status- 1. Unemployed 2. Employed
- Income group- 1. Lowest 2. Middle 3. Highest

CVD Risk Factors

- Hypertension- 1. Not Hypertensive 2. Hypertensive
- Diabetes – 1. Diabetes 2. Not Diabetic
- Obesity- 1. Not Obese 2. Obese
- Tobacco use- 1. Former 2. Current 3. Never
- Alcohol use- 1. Former 2. Current 3. Never

Multivariate age and sex adjusted analysis was conducted on the data to establish the individual and collective relationship between the independent variables (socioeconomic factors) and the dependent variables (CVD risk factors) for each of the rural and urban populations. Chi square test was applied to test for difference in data obtained between the rural and urban populations (for nominal data). Statistical significance was set at $p<0.05$. Multiple logistic regression analyses to estimate independent effects of the different SES indicators on risk factors were performed. In all analyses, P-value < 0.05 was regarded as significant.

3.8. Limitations

In spite of stringent efforts to minimize bias, there is a potential for recall and measurement bias in the primary study arising from eliciting information regarding the duration of CVD risks. The current study is reliant on the data integrity of the primary study.

Due to variation in geographical factors, socioeconomic status of different communities and availability of facilities, the generalisability of the results obtained from this study might not be possible in different urban and rural settings within South Africa, but it is likely this study will be useful in the other settings which are at close proximity to the PURE study communities.

In addition to the above limitations, unequal number of males and females may have been recruited affecting gender representativeness.

3.9 Ethical Considerations

The proposal for this study was submitted to the UWC Research and Ethics committee for approval. Permission to conduct the study was requested from the International Steering Committee of the PURE study and the local Principal Investigators (Prof Thandi Puoane and Dr Ehimario Igumbor). The request for permission made it clear that the proposed study is primarily being conducted as research for the award of the Masters in Public Health (MPH) degree at the UWC.

Ethical clearance for the primary PURE study was obtained from the UWC Research and Ethics committee (Ref#:08/4/4 – appendix I). To be included in the cohort, permission was received from all participants in the study following explanation of the study objectives. The

proposed analytical study is in line with the objective presented to study participants when they were recruited at baseline. Their participation in the study was voluntary and it was explained to them that they are free to leave the study at any time. It was further explained that participation in the study will not have any negative consequences upon them and that their rights before beginning of study was maintained. All participants signed an informed consent form when they agree to participate in the study.

During data handling, cleaning and analysis in the PURE study, only codes were used instead of names, and the final outcome was reported devoid of identities. All data was kept in lockable cabinets and computers which was accessible only by the researchers. The current study also kept to this data handling principle. Results of the current analysis will be disseminated in line with the primary study protocol of publishing study results.

CHAPTER 4: RESULTS

4.1 Study population and demographic profile

A total of One thousand nine hundred and seventy-six (1976) respondents were recruited in the urban and rural arms of the PURE Cape Town study between 2009 and 2010. Using inclusion criteria for the purpose of this study, 1958 participants were eventually selected as 3 were aged below 30 years and 15 above 70 years. 1407 participants (71.9%) were females while 551 (28.1%) were males. 1046 (53.4%) participants were urban residents while 912 (46.6%) were rural residents. The overall mean age (± standard deviation) of participants was 49.80 (±10.14) years; urban 49.29 (±10.04) and rural 50.38 (±10.24) hence rural residents were found to be slightly older than urban residents, $P<0.05$. Fig. 1 shows the distribution of participants by age group.

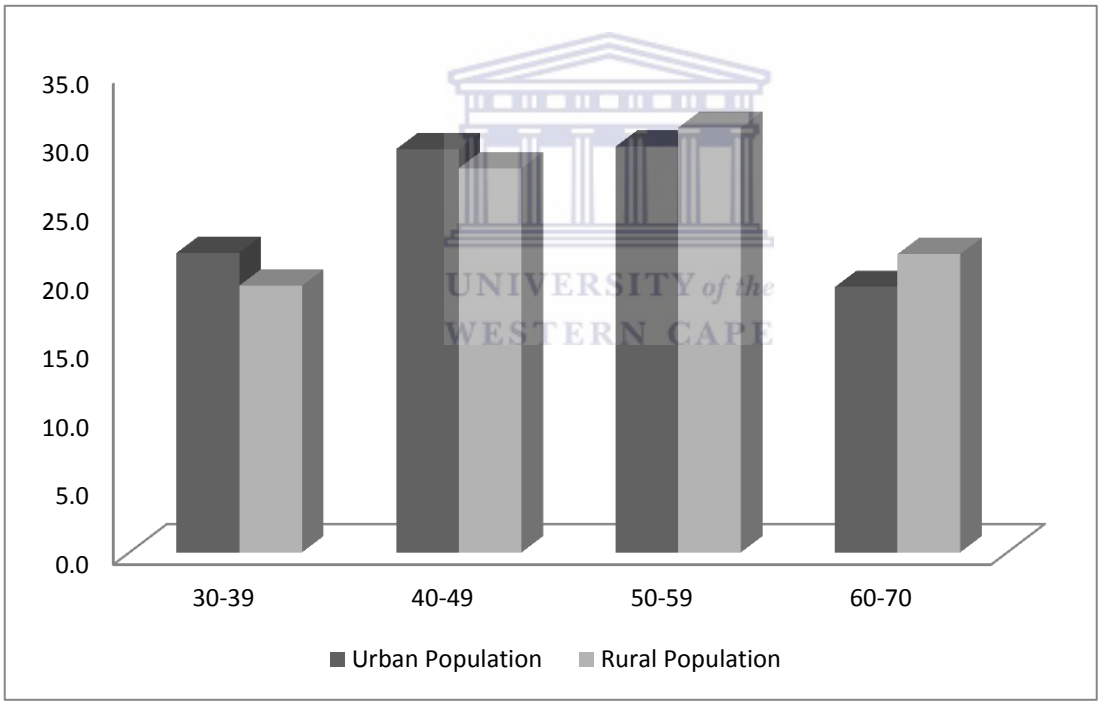

Figure 1: Age group distribution of study participants by location

Source: Data used for the chart was self-calculated from the PURE (Cape Town study) data using SPSS version 20

4.2. Correlation between SES indicators

Educational level completed was positively correlated with income group (Kendall's τ =0.19, P<0.000) and employment status (Kendall's τ =0.24, P<0.000) as were employment status and income group (Kendall's τ = 0.19, P<0.000).

4.3 Socio-economic characteristics of study participants

The socio-economic characteristics of the study population were established using descriptive statistics that considered mostly categorical data. Table 1 shows the socio-economic characteristics of study participants by location of residence.

4.3.1. Overall

Most of the participants (59.1% (95% CIs 56.8 to 61.1%)) in the study had completed at least secondary education and a further 31.9% (95% CIs 29.9 to 34.1%) had completed only primary education. Only a few 2.8% (95% CIs 2.2 to 3.6%) had no education at all and about 6.2% (95% CIs 5.1 to 7.3%) completed the post-secondary education. More females completed secondary education while more males completed post-secondary education. More males had no education at all.

Majority of the participants were married/co-habiting 42% (95% CIs 39.8 to 44.1%) or single 38.5% (95% CIs 36.3 to 40.8%) while only a few were divorced/separated 6.2% (95% CIs 5.2 to 7.2%). A further 13.3% was also found to be widowed. More males reported being married/co-habiting with a partner while more females reported being single.

Unemployment was very high among the study participants with about 75.9% (95% CIs 73.6 to 77.7%) reporting being unemployed. Employment rate was higher for male participants compared to the females (28.1% vs. 22.5%).

The median household income of all study participants was R1080 (Range: R70 to R23000) with modal income of R1080. When analysis was restricted to only those who were employed, the mean income was R3285 (SD =R3594) while the median income became R2000 (Range R100 to R23000) with a modal income of R1000. Male participants reported higher household earning than the females with mean and median incomes of R2494 vs. R1783 and R2500 vs. R1500 respectively for employed participants.

Table 1: Socio-Demographic characteristics of study participants

	Urban	Rural	Overall
Age (years)	49.29 (±10.04)	50.38 (±10.24).	49.80 (±10.14)
Sex			
Female	68.8% (720)	75.3% (687)	71.9% (1407)
Male	31.2% (326)	24.7% (225)	28.1% (551)
Education			
None	2.0% (21)	3.7% (34)	2.8% (55)
Primary	20.4% (212)	45.0% (409)	31.9% (621)
Secondary	68.8% (715)	48.0% (436)	59.1% (1151)
Post-Secondary	8.8% (92)	3.2% (29)	6.2% (121)
Marital status			
Never married	47.2% (488)	28.5% (258)	38.5% (746)
Married/Co-habiting	37.5% (388)	47.2% (427)	42.0% (815)
Widowed	8.6% (89)	18.7% (169)	13.3% (258)
Divorced/Separated	6.7% (69)	5.6% (51)	6.2% (120)
Employment Status			
Employed	27.5% (260)	19.8% (145)	23.9% (406)
Unemployed	72.5% (686)	80.2% (588)	76.1% (1290)
Income Group			
Lowest	15.9% (111)	34.8% (265)	25.8% (376)
Middle	45.3% (316)	53.2% (405)	49.4% (721)
Highest	38.8% (271)	12.0% (91)	24.8%(362)

Source: Self calculation from the PURE (Cape Town study) data using SPSS version 20.

4.3.2. Urban-Rural profile

In the urban location, more than two-thirds 68.8% (95% CIs 65.9 to 71.7%) of the participants had competed secondary education with 20.4% completing only primary education while in the rural location, less than half of the participants had completed secondary education 48% (95% CIs 44.6 to 51.2%) and almost half (45%) had completed only primary education. More participants in the urban location had completed post-primary education and less number had no education compared to the rural area; 8.8 vs. 3.2% & 2.0 vs. 3.7% respectively. In all, the educational profile of participants in both locations was found to be significantly different with a P-value <0.05.

The marital status characteristic of participants was different in both locations. While majority of the participants in the urban area were found to be single 47.2% (95% CIs 44.6 to 50.5%) as against 28.5% (95% CIs 25.4 to 31.5%) in the rural area, majority of the participants in the rural area (47.2%) reported being married or co-habiting with a partner as compared to 37.5% in the urban location. Analysis also showed that more of the rural participants are widowed compared to the urban participants while urban location had more participants who are divorced or separated compared to the rural location (6.7 vs. 5.6%). The difference in the marital status characteristics of the urban and rural participants was found to be significant at a P-value <0.05.

While unemployment was found generally to be very high among the study participants (76.1%), it was found to be significantly higher in the rural location at 80 .2% (95% CIs 77.5 to 82.9%) compared to the urban location at 72.5% (95% CIs 69.5 to 75.4%), P=0.000. Unemployment rate was also higher for female participants in both locations compared to the males. The overall association between employment status and the sex of a participant was significant at a P-value =0.015 but at each individual location, the association was not significant at P-value=0.078 (urban) and 0.201 (rural).

Analysis of income distribution among the two study groups showed that the mean and median monthly household income for urban participants is R2621 and R1500 (range R100 – R23000) respectively while for the rural participants, it is R1357 and R1010 (range R70 – R13000) respectively. Fig. 1 shows the Household income distribution (categorised) of study participants according to their location. When categorized into three groups using arbitrary criteria (described in the methodology), both locations had more participants who belonged to the middle income group 45.3% (urban) and 53.2% (rural), however in the urban locations, more participants belong to the highest income group (38.8%) compared to the lowest income group (15.9%) while in the rural location, the trend was reversed as more participants belonged to the lowest income group (34.8%) compared to the highest income group (12.0%). The household income profile of the rural and urban participants were found to be significantly different at a P-value=0.000.

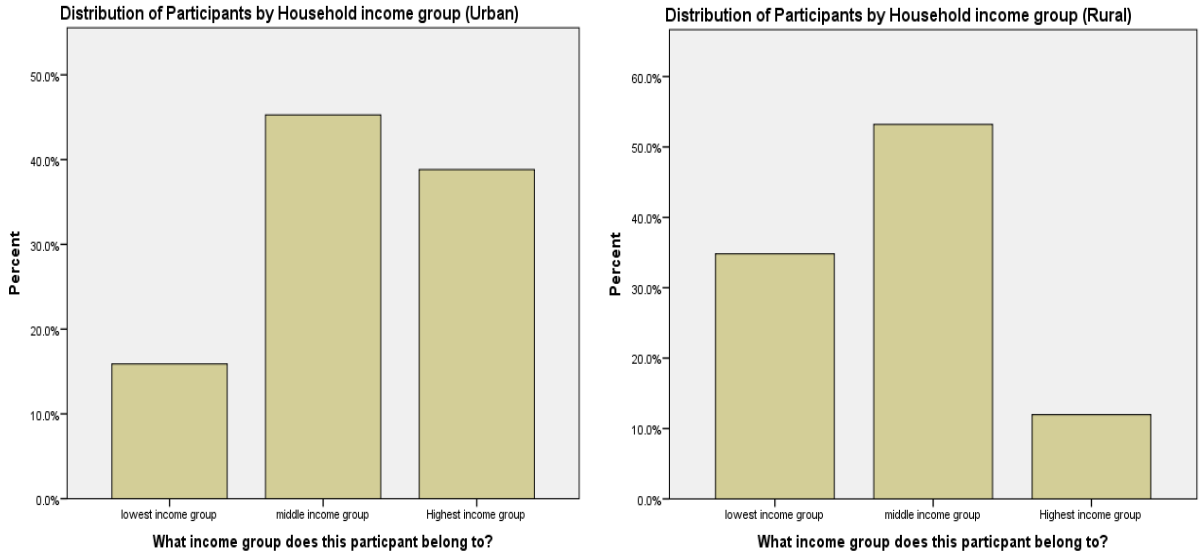

Figure 2: Distribution of study participants according to the household income group in the urban and rural locations

Source: Data used for the chart was self-calculated from the PURE (Cape Town study) data using SPSS version 20

4.4. Prevalence of CVD Risk factors

4.4.1. Overall

Table 2 shows the overall prevalence of various CVD risk factors as well as their prevalence in each of the two study locations.

The analysis showed that hypertension was the most prevalent CVD risk factor found among study participants with about 72.8% (95% CIs 70.3 to 75.1%) classified as hypertensive using the set diagnosis criteria. Significantly more females (75.5%) were found to be hypertensive compared to males (63.5%) at a P-value =0.000

Using BMI categorization, almost half of the study participants were found to be obese 48.5% (95% CIs 45.4 to 51.6%). A significant number (70.5%) were found to be either overweight or obese while only a few were underweight, 2.9% (95% CIs 2.0 to 3.9%).

4.4.2 Urban-Rural profile

Most individual CVD risk factors were more prevalent among participants in the urban location. Diabetes, obesity and alcohol consumption were all significantly more prevalent in the urban compared to the rural location while hypertension and tobacco use prevalence were not significantly different between the two locations. Fig.3 shows the comparison of the prevalence of CVD risk factors between urban and rural participants.

Table 2: Frequency (categorical) and mean (continuous) distribution of CVD Risk factors of study participants by location

	Urban	Rural	Overall
Blood Pressure (mmHg)			
Mean Systolic BP	140 (SD± 25)	143 (SD± 25)	142 (SD ±25)
Mean Diastolic BP	90 (SD± 16)	92 (SD±16)	91 (SD ±16)
Hypertension Categories			
Hypertensive	74.0% (424)	71.9% (539)	72.6% (957)
Not Hypertensive	26.0% (149)	28.1% (211)	27.4% (361)
BMI Categories			
Underweight (<18.5)	3.5% (15)	2.6% (18)	2.9% (33)
Normal (18.5 -24.9)	21.8% (94)	29.6% (206)	26.6% (300)
Overweight (25.0 -29.9)	16.9% (73)	25.1% (175)	22.0% (248
Obese (>30.0)	57.8% (249)	42.8% (249)	48.5% (547)
Diabetes Categories			
Diabetes Medication	11.2% (111)	7.7% (70)	9.5% (181)
No Diabetes medication	88.8% (881)	92.3% (840)	90.5% (1721)
Tobacco use			
Never	78.3% (756)	77.9% (707)	78.1% (1463)
Currently	17.8% (172)	17.1% (155)	17.5% (327)
Former	3.9% (38)	5.0% (45)	4.4% (83)
Alcohol use			
Never	76.1% (748)	86.3% (785)	81.0% (1533)
Currently	19.5% (192)	11.1% (101)	15.5% (293)
Former	4.4% (43)	2.6% (24)	3.5% (67)

Source: Self calculation from the PURE (Cape Town study) data using SPSS version 20

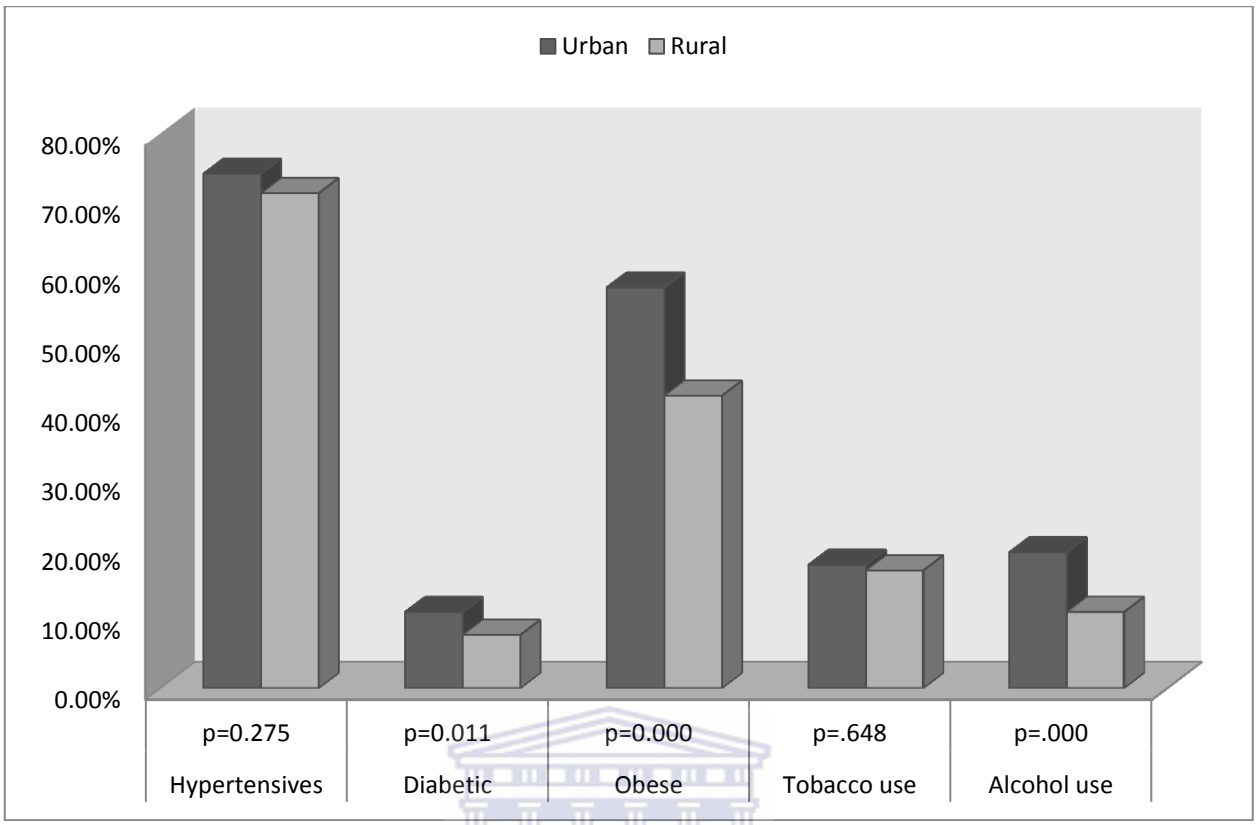

Figure 3: Comparison of the prevalence of CVD risk factors between urban and rural study participants

Source: Data used for the chart was self-calculated from the PURE (Cape Town study) data using SPSS version 20

4.5. Distribution of CVD Risk factors by Socioeconomic Gradient.

Having shown that most CVD risk factors were more prevalent in the urban locations compared to the rural, further analysis was done to ascertain the distribution of CVD risk factors according to the socioeconomic variable levels in the two locations and for the overall study population. This was done using cross-tabulation and by computing the Chi square as well as the P-values. Generally there were no consistent patterns or regular trend to the distribution but some findings were of note. Sex was found to be the variable with most consistent association across most CVD risk factors. Marital status and income group also showed some level of significant association with most of the CVD risk factors.

4.5.1. Overall

Hypertension

The distribution of Hypertension was not significantly different between participants with various completed educational level but those in the middle and highest income groups were found to have higher prevalence of hypertension with a P-value=0.000 compared to the lowest income groups and the distribution was significantly different between the various marital status categories. Widowed participants were found to have the highest prevalence of hypertension overall (83.3%) while single participants had the lowest prevalence overall (68.4%). Table 3 shows the distribution of CVD risk factors according to socioeconomic factors level in the total study population.

Diabetes Mellitus

As was seen with hypertension, diabetes mellitus distribution was not significantly different in the various educational levels but with regards to income, was found to be more prevalent among participants in the middle and highest income groups P-value<0.05 (Table 3). Widowed participants once more had higher prevalence of diabetes compared to other marital status categories and this was sitting at the borderline of significance with P-value of 0.059 using Pearson's Chi Square test and very significant at P-value of 0.024 using Linear by Linear Association test. The association between self-reported diagnoses of diabetes and employment status was not significant in the study population, P-value >0.05.

Obesity

Educational level completed was not found to be a factor in the prevalence of Obesity among study participants. This is also true for the association between marital status and Obesity as there was no significant association found. 53.5% of participants belonging to the highest income group were obese while 43.4% of those in the lowest income group were obese (Table 3). This association was however not statistically significant, P-value =0.131.

Tobacco Use

The distribution of tobacco use was different from that of Hypertension and Diabetes as participants with no education and those unemployed were found to currently smoke more than

those with higher educational attainment and those who are employed. Table 3 shows the distribution.

Table 3: Relationship between CVD risk factors and Socioeconomic variables in the overall study population

	Hypertension		Obesity		Diabetes		Tobacco Use		Alcohol use	
	(n) %	P-value	(n) %	P-value	(n) %	P-value	(n) %	P-value	(n) %	P-value
Age (yrs.)										
30 – 39	(209) 75.5%	0.644	(85) 42.9%	0.312	(41) 10.4%	0.238	(76) 19.3%	0.462	(68) 17.3%	0.353
40 -49	(271) 72.5%		(157) 48.2%		(48) 8.9%		(96) 18.0%		(80) 14.9%	
50 -59	(279) 71.0%		(193) 51.1%		(46) 8.0%		(88) 15.7%		(74) 13.0%	
60 -70	(204) 73.1%		(112) 49.6%		(46) 11.7%		(67) 17.4%		(71) 18.1%	
Sex										
Female	(772) 75.2%	0.000	(386) 47.5%	0.273	(147) 10.7%	0.06	(152) 11.2%	0.000	(129) 9.4%	0.000
Male	(191) 63.5%		(161) 51.1%		(34) 6.5%		(175) 34.2%		(164) 31.5%	
Education										
None	(36) 75%	0.209	(14) 51.9%	0.980	(6) 11.1%	0.762	(15) 28.3%	0.001	(10) 18.5%	0.449
Primary	(373) 75.3%		(200) 48.9%		(68) 11.0%		(106) 17.3%		(82) 13.3%	
Secondary	(519) 71.6%		(300) 48.2%		(107) 9.5%		(189) 17.1%		(185) 16.5%	
Post-Secondary	(31) 63.3%		(31) 47.7%		(9) 9.1%		(15) 16.0%		(15) 15.5%	
Marital status										
Never married	(312) 68.4%	0.001	(219) 53.5%	0.600	(54) 7.5%	0.059	(139) 19.6%	0.06	(145) 20.1%	0.000
Married/Co-habiting	(404) 72.3%		(229) 47%		(81) 10.3%		(137) 17.6%		(103) 13.1%	
Divorced/Separated	(59) 72%		(26) 40%		(12) 10.2%		(21) 17.9%		(20) 7.9%	
Widowed	(180) 83.3%		(70) 44.6%		(33) 12.8%		(27) 10.8%		(22) 18.6%	
Employment Status										
Employed	(131) 66.5%	0.049	(352) 48.9%	0.487	(29) 7.5%	0.168	(49) 13.0%	0.017	(204) 16.3%	0.146
Unemployed	(661) 73.4%		(119) 51.5%		(124) 9.9%		(228) 18.4%		(51) 13.4%	
Income Group										
Lowest	(195) 63.1%	0.000	(112) 44.3%	0.131	(23) 6.1%	0.019	(63) 16.9%	0.717	(62) 16.5%	0.011
Middle	(436) 78.4%		(202) 46.7%		(81) 11.3%		(116) 16.4%		(91) 12.8%	
Highest	(151) 77.8%		(108) 53.5%		(37) 10.8%		(63) 18.7%		(64) 18.9%	

Source: Self calculation from the PURE (Cape Town study) data using SPSS version 20

Alcohol Consumption

Alcohol use was noted to be significantly more common among participants in the higher SES group and men. The distribution pattern of current alcohol use is shown in Table 3.

Tables 4-6 show comparison of the distribution of selected CVD risk factor variables according the SES variable categories between urban and rural participants.

Table 4: Comparison of the distribution of Hypertension prevalence by Socioeconomic variables categories in rural, urban and total study populations.

	Hypertension					
	(n) %	P-value	(n) %	P-value	(n) %	P-value
	Urban		Rural		Total	
Age (yrs.)						
30 – 39	(94) 71.8%	0.711	(115) 78.8%	0.206	(209) 75.5%	0.644
40 -49	(120) 73.6%		(151) 71.6%		(271) 72.5%	
50 -59	(121) 73.3%		(158) 69.3%		(279) 71.0%	
60 -70	(89) 78.1%		(115) 69.7%		(204) 73.1%	
Sex						
Female	(338) 77.5%	0.001	(434) 74.1%	0.012	(772) 75.2%	0.000
Male	(86) 62.8%		(105) 64.0%		(191) 63.5%	
Education						
None	(10) 62.5%	0.296	(26) 81.3%	0.186	(36) 75%	0.209
Primary	(110) 77.5%		(263) 74.5%		(373) 75.3%	
Secondary	(284) 74.0%		(235) 68.9%		(519) 71.6%	
Post -Secondary	(17) 63.0%		(14) 63.3%		(31) 63.3%	
Marital status						
Never married	(176) 68.0%	0.000	(136) 69.0%	0.092	(312) 68.4%	0.001
Married/Co-habiting	(153) 73.6%		(251) 71.5%		(404) 72.3%	
Divorced/Separated	(29) 82.9%		(30) 63.8%		(59) 72%	
Widowed	(61) 92.4		(119) 79.3%		(180) 83.3%	
Employment Status						
Employed	(73) 70.9%	0.483	(58) 61.7%	0.031	(131) 66.5%	0.049
Unemployed	(309) 74.3%		(352) 72.7%		(661) 73.4%	
Income Group						
Lowest	(48) 58.5%	0.000	(147) 64.8%	0.006	(195) 63.1%	0.000
Middle	(166) 81.4%		(270) 76.7%		(436) 78.4%	
Highest	(105) 78.9%		(46) 75.4%		(151) 77.8%	

Source: Self calculation from the PURE (Cape Town study) data using SPSS version 20

Table 5: Comparison of the distribution of Diabetes prevalence by Socioeconomic variables categories in rural, urban and total study population

	Diabetes					
	(n) %	P-value	(n) %	P-value	(n) %	P-value
	Urban		Rural		Total	
Age (yrs.)						
30 – 39	(23) 10.5%	0.301	(18) 10.2%	0.189	(41) 10.4%	0.238
40 -49	(27) 9.4%		(21) 8.3%		(48) 8.9%	
50 -59	(32) 11.0%		(14) 5.0%		(46) 8.0%	
60 -70	(29) 14.9%		(17) 8.6%		(46) 11.7%	
Sex						
Female	(85) 12.2%	0.107	(62) 9.0%	0.008	(147)10.7%	0.06
Male	(26) 8.7%		(8) 3.6%		(34) 6.5%	
Education						
None	(3) 15.0%	0.012	(3) 8.8%	0.066	(6) 11.1%	0.762
Primary	(35) 16.7%		(29) 7.1%		(68) 11.0%	
Secondary	(70) 10.1%		(32) 7.4%		(107) 9.5%	
Post -Secondary	(3) 4.3%		(6) 20.7%		(9) 9.1%	
Marital status						
Never married	(41) 8.8%	0.014	(13) 5.0%	0.22	(54) 7.5%	0.059
Married/Co-habiting	(42) 11.6%		(39) 9.2%		(81) 10.3%	
Divorced/Separated	(18) 20.5%		(15) 8.9%		(12) 10.2%	
Widowed	(9) 13.4%		(3) 5.9%		(33) 12.8%	
Employment Status						
Employed	(19) 7.9%	0.067	(42) 7.2%	0.914	(29) 7.5%	0.168
Unemployed	(82) 12.2%		(10) 6.9%		(124) 9.9%	
Income Group						
Lowest	(9) 8.2%	0.163	(251) 94.7%	0.069	(23) 6.1%	0.019
Middle	(44) 14.2%		(367) 90.8%		(81) 11.3%	
Highest	(26) 10.3%		(80) 87.9%		(37) 10.8%	

Source: Self calculation from the PURE (Cape Town study) data using SPSS version 20

Table 6: Comparison of the distribution of Tobacco use prevalence by Socioeconomic variables categories in rural, urban and total study population

	Tobacco use					
	(n) %	P-value	(n) %	P-value	(n) %	P-value
	Urban		Rural		Total	
Age (yrs.)						
30 – 39	(39) 17.9%	0.856	(37) 21.0%	0.067	(76) 19.3%	0.462
40 -49	(53) 19.0%		(43) 16.9%		(96) 18.0%	
50 -59	(52) 18.5%		(36) 16.9%		(88) 15.7%	
60 -70	(28) 14.9%		(39) 19.8%		(67) 17.4%	
Sex						
Female	(83) 12.3%	0.000	(69) 10.1%	0.000	(152) 11.2%	0.000
Male	(89) 30.8%		(86) 38.6%		(175) 34.2%	
Education						
None	(5) 26.3%	0.147	(10) 29.4%	0.002	(15) 28.3%	0.001
Primary	(28) 13.7%		(78) 19.1%		(106) 17.3%	
Secondary	(129) 19.1%		(60) 13.9%		(189) 17.1%	
Post- Secondary	(9) 13.8%		(6) 20.7%		(15) 16.0%	
Marital status						
Never married	(98) 21.5%	0.016	(41) 16.1%	0.259	(139) 19.6%	0.06
Married/Co-habiting	(56) 15.8%		(81) 19.0%		(137) 17.6%	
Divorced/Separated	(9) 13.6%		(12) 23.5%		(21) 17.9%	
Widowed	(7) 8.6%		(20) 11.8%		(27) 10.8%	
Employment Status						
Employed	(32) 13.7%	0.112	(17) 11.8%	0.154	(49) 13.0%	0.017
Unemployed	(126) 19.4%		(102) 11.8%		(228) 18.4%	
Income Group						
Lowest	(21) 19.1%	0.957	(42) 16.0%	0.541	(63) 16.9%	0.717
Middle	(57) 18.8%		(59) 14.6%		(116) 16.4%	
Highest	(49) 19.9%		(14) 15.4%		(63) 18.7%	

Source: Self calculation from the PURE (Cape Town study) data using SPSS version 20

4.5.2 Multivariate Analysis

Tables 7 and 8 below show the result of multivariate analysis using logistic regression adjusting for age and sex. Following the analysis, only marital status maintained consistent association with the selected CVD risk factors while income and employment status retained association with a couple of the risk factors but not for others. Being a widow/widower was the most likely predictor of hypertension in urban locations with AOR = 5.46 (95% CI 2.16 – 14.16) and Education from the analysis was not found to be a likely predictor of CVD risk in the study participants both in urban and rural locations.

Table 7: Age & Sex adjusted odds ratio of CVD risk by SES gradient in the Urban study population

	Diabetes			Hypertension			Tobacco Use		
	OR	95% CI		OR	95% CI		OR	95% CI	
Education									
None	1.0			1.0			1.0		
Primary	1.075	0.297	3.889	1.907	0.631	5.760	1.994	.554	7.181
Secondary	0.584	0.166	2.058	1.478	0.513	4.258	1.007	.440	2.305
Post-secondary	0.237	0.044	1.287	0.997	0.272	3.653	1.719	.813	3.635
Marital status									
Single	1.0			1.0			1.0		
Married/ Co-habiting	1.412	0.894	2.230	1.428	0.945	2.158	.569	.390	.831
Widowed	2.560	1.389	4.720	5.461	2.106	14.161	.388	.171	.881
Divorced/Separated	1.699	0.782	3.691	2.499	0.987	6.327	.457	.214	.977
Employment Status									
Employed	1.0			1.0			1.0		
Unemployed	1.590	0.942	2.684	1.137	0.699	1.850	1.645	1.069	2.532
Income group									
Lowest	1.0			1.0			1.0		
Middle	1.814	0.853	3.857	3.043	1.725	5.369	.999	0.562	1.776
Highest	1.324	0.596	2.940	2.828	1.526	5.243	.880	0.487	1.592

Source: Self calculation from the PURE (Cape Town study) data using SPSS version 20

Table 8: Age & Sex adjusted odds ratio of CVD risk by SES gradient in the Rural group

	Diabetes			Hypertension			Tobacco Use		
	OR	95% CI		OR	95% CI		OR	95% CI	
Education									
None	1.0			1.0			1.0		
Primary	0.680	0.193	2.389	2.004	0.675	5.952	1.237	0.355	4.307
Secondary	0.691	0.198	2.419	1.665	0.589	4.707	0.861	0.319	2.325
Post-secondary	2.298	0.511	10.342	1.005	0.279	3.614	0.628	0.231	1.708
Marital status									
Single	1.0			1.0			1.0		
Married/Co-habiting	1.983	1.034	3.803	1.145	0.780	1.680	1.135	0.734	1.756
Widowed	1.617	0.746	3.507	1.610	0.974	2.662	1.011	0.552	1.852
Divorced/Separated	1.174	0.321	4.299	0.799	0.408	1.001	1.696	0.781	3.686
Employment Status									
Employed	1.0			1.0			1.0		
Unemployed	2.759	1.158	6.575	1.137	0.699	1.850	1.858	1.042	3.315
Income group									
Lowest	1.0			1.0			1.0		
Middle	1.746	0.922	3.310	1.737	1.198	2.518	0.940	0.593	1.489
Highest	2.708	1.167	6.283	1.667	0.869	3.195	0.698	0.342	1.425

Source: Self calculation from the PURE (Cape Town study) data using SPSS version 20

Table 9 below shows the distribution of CVD risk factors by socioeconomic predictors after logistic regression adjusting for age, sex and all the socioeconomic variables included in the study. The analysis showed both areas of similarities and areas of difference in distribution hence a categorical conclusion could not be reached on whether there is a difference in the distribution of CVD risk factors by socioeconomic between the two population groups.

Table 9: Distribution of independent Socio-economic predictors of CVD risk by location

	Hypertension	Diabetes	Tobacco use	Alcohol use
Overall	Widowed, Female, High income earners, Unemployed	Widowed, high income earners	Unemployed, Male, Single	Male, Single
Urban	widowed, high income earners	Widowed	Single, unemployed, male	Male
Rural	Unemployed, female	Female	Male, Single	Male, low income earners

CHAPTER 5: DISCUSSION

In this study, the relationship between SES (education, income, marital status and employment status) and risk of cardiovascular disease in Black South Africans in both an urban and rural population was studied and compared. The results show that the SES of adult Black South Africans living in the urban location was significantly different from those in the rural location; that CVD risk factors were generally more prevalent among urban adult Black Africans compared to the rural Black Africans and that socioeconomic factors are inconsistently associated with CVD risk both in the total population and in the two study populations.

5.1. Socio-economic profile: Rural-Urban comparison

The SES is expected to be different between the two study groups and that there will be more people who belonged to the lower SES in the rural group while more people will belong to the higher SES in the urban group (Statistics South Africa 2011).

In total, many of the participants had completed secondary education (59.1%) but only 6.2% had completed post-secondary education, while 2.8% had no education. This seems to suggest low level of higher education attainment among the study population and resembles in some way while differing in some others findings of the 2011 South African Census. According to Statistics South Africa General Household Survey (2011), about 8.3% of Black South Africans attained post-secondary education as at 2011 while about 10.5% had no education at all. More people in the urban group had higher level of completed education compared to the rural group and this was not surprising. Again according to Statistics South Africa (2011) the two provinces sampled in the PURE study (Western and Eastern Cape) had significantly different educational attainment percentages. Monthly household income was significantly different between the urban and rural populations, with average monthly income of R2621 and R1357 for urban and rural groups $P<0.000$ comparing very well with the calculated 2000 average monthly income for Black South Africans of R2502 and R1272 as reported by statistics South Africa (2002). However the just released 2011 census data shows a significant difference between the calculated monthly household income for Western Cape and Eastern Cape, the two provinces involved in the PURE Cape Town study, (Statistics South Africa, 2012: 41). Both employment and marital status were also significantly different between the two groups. The proportion of participants who are employed was higher in the urban location compared to the rural location

(27.5% vs 19.8%) and there were significantly more single participants in the urban compared to rural location but more married and widowed participants in the rural location. This disparity in marital status could be attributed in part to the fact that urban participants were significantly younger in age compared to the rural participants while the better employment status of the urban participants could be attributable to their better educational attainment compared to the rural participants. Urban participants were more likely to have attained secondary or post-secondary education compared to rural participants, $P<0.05$ and educational attainment was found to be positively correlated with employment. Overall from our study, there is significant difference in the socioeconomic profile between urban and rural Black Africans and the urban participants had higher SES standing compared to the rural participants. This is consistent with observation from the Census 2011 results.

5.2. CVD Risk factors: Prevalence, Rural-Urban Comparison

CVD risk factors are reportedly on the rise globally with sub-Saharan African countries undergoing epidemiological transition stated to be particularly at higher risk. The prevalence of CVD risk was high in the study population with about 74% of participants having at least one CVD risk factor. Overall individual CVD risk factors were significantly more prevalent among urban participants except for hypertension and tobacco use which prevalence although higher were not statistically significant. The South African Demographic and Health Survey (SADHS) 2003 found urban dwellers more likely to be hypertensive compared to rural dwellers but prevalence rates of hypertension was lower in the survey (Department of Health 2007). Hypertension was the most prevalent CVD risk factor in the current study just as have been reported by many other studies carried out in South Africa. 72% of participants were found to be hypertensive (74% urban and 71% rural). Van Zyl *et al* (2010) found in their study that prevalence of self-reported hypertension was 63.1% which is comparable to what this study shows. Other studies carried out in South Africa equally reported hypertension as the most prevalent CVD risk factors though with varying percentages, Sliwa *et al* (2008) reported that 56% of participants in the Heart of Soweto study were hypertensive. The lower prevalence of hypertension reported by the SADHS 2003 could be due to the fact that In the SADHS the age of participants ranged from 15 years and above while in this PURE cohort, participants ages were between 30 to 70 years. Since hypertension is known to increase with age, this could have tilted the prevalence noted in the current study towards higher value. In addition to this, females

were significantly more likely to be hypertensive in the current study and considering the higher unequal representation of females compared to males (71.9% vs 28.1%) in the study sample, there could have been further shift to higher prevalence of hypertension reported in this study compared to other studies. The high prevalence of hypertension recorded in the current study can also be attributed to urbanization, westernization of rural locations as well as other stressors related to poverty. Again high level of psychosocial stress which has been documented as a major determinant for CVD risk may have contributed to the high reported number.

In this study, prevalence of diabetes was 9.5% and was significantly more in the urban compared to the rural location (11.2% vs 7.7%). van Zyl *et al* (2010) reported diabetes prevalence of 10.8% in rural Free State study while Alberts *et al* (2005) stated that 8.8% and 8.5% of men and women respectively were found to have diabetes in their study among Black Africans living in rural Limpopo. Our finding of 7.7% prevalence of diabetes in the rural population closely resembles the number reported by Alberts *et al* (2005).

Obesity was the second most prevalent risk factor found in our study group with almost half of the study population obese (48.5%). In a related study, Tibazarwa, Ntyintyane, Sliwa, Gerntholtz, Carrington, Wilkonson & Stewart (2009) found that 43.5% of participants in a study in Soweto were obese. "Over nutrition" has been suggested as a major reason for high obesity among South Africans (Puoane *et al* 2002) as well as the exposure to urban lifestyle with limited physical activity. The high percentage of participant with obesity (57.8% -urban vs 42.8%-rural) tends to support the assertion that urbanization plays some major role in the development of obesity. Mathenge *et al* (2010) found higher obesity prevalence in urban location compared to the rural in Kenya. Some studies have documented that urban residence and the wealthier people are more likely to be obese for reasons ranging from nutritional transition to reduced physical activity. However in the current study, obesity was not significantly associated with income. It is pertinent to note that increased or reduced physical activity may affect an individual's chances of developing CVD and could have been a confounder in the study outcome. Although the PURE study gathered data on the physical activity of participants, it was not part of the variables included in the study. It will be useful therefore in future studies to include the possible interactions of physical activity and

psychosocial factors with socio-economic factors in predicting the development or occurrence of CVD risks in the studied population.

Alcohol consumption and tobacco use were both found to be higher in the urban location although this relationship was not significant with tobacco use. The prevalence rate of alcohol use found in the current study (15.5% overall) is lower than the alcohol use prevalence reported in the SADHS 2003 for Black population group (23.2%). There is a chance current alcohol use was underreported in this cohort considering the fact that the current alcohol use question in the PURE questionnaire did not specify the period covered by "current" whereas the SADHS 2003 explicitly stated this to be in the past 12 months. It could also be due to the fact that the current study had disproportionally more females who in turn are known to have lower prevalence of alcohol use compared to men. However the two studies were similar in finding that alcohol use prevalence is higher in the urban compared to rural location. In this study, 31.5% and 9.4% of males and females respectively were found to use alcohol currently and this compared well with SADHS 2003 findings of 35.2% and 11.4% Black males and females respectively using alcohol currently. The higher prevalence of alcohol use in the urban location in this study could be explained by the fact that there are more single participants, higher income earners in this location and these two factors were found to be significantly associated with alcohol use in the current study.

It is interesting to note that although the most individual CVD risk factors are more prevalent in the urban location, people in the rural location were more likely to have at least one CVD risk factor. This was even made more complex when our analysis showed a pattern of higher clustering of 1 or 2 CVD risk factors among rural participants but higher clustering of ≥3 CVD risk factors among urban dwellers, $P<0.000$. The reasons for this observed pattern of clustering could not be alluded to immediately and would be an interesting area of further study. This study has shown that urban dwellers have higher prevalence of most CVD risk factors compared to rural dwellers.

5.3. Distribution of CVD risk factors by Socio-economic gradient

5.3.1. Total population

Using bivariate analysis, in the general study population, gender, marital status, employment status and income were the socio-economic variable significantly associated with hypertension. Being female, widow/widower, unemployed and highest income earner were found to be significantly associated with hypertension compared to their other group categorization. Female gender has been documented by several studies to be more likely to be hypertensive than males; (SADHS, 2003: Alberts *et al*, 2005). It is important to note that widowed participants were significantly more likely to be hypertensive while single participants were the least likely. This could be related to the presence of psychosocial stressors ranging from financial to emotional deprivation. Diabetes was only significantly associated with income and the highest income earners were found to have higher prevalence compared to the lowest income earners. Studies in the developed world suggest that diabetes is greater in low socioeconomic groups (Rabi, Edwards, Southern, Svenson, Sargious, Norton, Larsen & Ghali 2006) while some studies in Sub Saharan Africa reported more diabetes in high socioeconomic group. Although the link between Diabetes and income is not stated explicitly, studies have shown relationship between obesity and diabetes. In this study and in other related studies (Mclaren, 2007: Sobal, J. & Stunkard, A.J., 1989) high income is also shown to be associated with obesity and this may explain the prevalence of diabetes noted among high income earners in our study.

Tobacco use was significantly more prevalent among males, participants with no education, unemployed group suggesting an association with lower SES status. Current alcohol use prevalence was more prevalent in the higher income group, single participants and males suggesting association with higher SES status. From the results of the bivariate analysis, it appeared that hypertension, Diabetes and Alcohol consumption were more prevalent in the high SES group while Tobacco use was more prevalent in the low SES group. The reason for this differential prevalence between the CVD risk factors was not immediately obvious.

Following multivariate logistics regression analysis adjusting for sex, age, and other SES variables, only marital status was found to be independently associated with all analysed CVD risk factors while income group retained its significant association with hypertension and diabetes. For widowed participants the odds of Hypertension and Diabetes were significantly

higher compared to single never married participants with adjusted OR 2.13 (CI 1.23 – 3.68, P=0.007) and OR 2.02 (CI 1.11 – 3.66, P = 0.021) respectively. Zhang and Hayward (2006), reported that people who have experienced marital loss have significantly higher prevalence of CVD risk compared to those in continuous marriage or never married. Presence of mental stressors in the former group could explain in part the reasons for this increased risk. It is essential that greater attention be paid to widowed and divorced persons for adequate CVD intervention. On the other hand, widowed participants were found to have reduced odds of using tobacco product or alcohol consumption compared to single participants. Overall hypertension and diabetes were more prevalent in the highest income earners and widowed participants while tobacco use was most prevalent among unemployed, single and male participants. Unemployment is an established significant risk factor for tobacco use (Henkel, 2011).

5.3.2. Rural – Urban Comparison

Comparing the distribution of CVD risk factors according the socioeconomic variable category of participants between the urban and rural populations showed inconsistent pattern but revealed some degree of difference as shown in fig. 9. The reason for this could not be unconnected with the nature of the population sampled for the PURE Cape Town study. Although the study setting included an urban and a rural location, the socioeconomic standing of the urban participants cannot be said to be fully representative of a typical South African Black population because the neighbourhood sampled is a township where most inhabitants are most likely to be of low or at most middle SES, thereby skewing our population towards more of low SES group. Further study where a systematic sampling with the aim of selecting participants fully representative of a typical South African Black community will be required to explore this difference in distribution. Another reason for this observation could be the exposure of South African rural populations to western lifestyle which invariably tends to bridge the gap in disease and socioeconomic conditions between the urban and rural populations. As stated by Opie and Seedat (2005: 3564), “there may be important differences between the non-industrialized, isolated rural tribes (as still exist in parts of Africa) and the semi-urban, the latter now under more pressure from “civilization”. Thus the “westernization” of rural population may contribute to the distribution of CVD risk in South Africa.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

This study re-affirms that the socioeconomic profile of adult Black South Africans differs between rural and urban population and that Black Africans in urban location have better socioeconomic standing in comparison to those in the rural locations. This was not surprising. The study also established that individual CVD risk factors are significantly more prevalent in the urban location compared to the rural location but goes on to show that the risk of having at least one CVD risk is greater in the rural location.

The finding that clustering of ≥3 CVD risk factors is more for urban populations while clustering of ≤2 CVD risk factors is more in the rural population could be linked to the extra risk posed by urbanization to individuals towards developing CVD, therefore calls for greater profiling of individuals to elicit those factors that may predispose individuals to CVD risk factors clustering

The study established that that there is a socioeconomic gradient in the distribution of CVD risk factors among adult Black South Africans with high income earners, widows & widowers having the greatest risk for Hypertension and Diabetes while unemployment poses the greatest risk for tobacco use. The implication of these is that socioeconomic factors should be given more attention when designing interventions to reduce or eliminate the burden of CVD in South Africa.

6.2 Recommendations

CVD risk reduction Interventions that recognise the differential susceptibility of individuals in different SES group need to be designed and implemented**.** Widows and widowers should be given more focussed attention in health screening as they may have increased vulnerability to diseases especially CVDs. There is a need for more research to establish the pathway through which SES factors predispose or protect individuals from CVDs. Further study to elicit factors responsible for the CVD risk clustering in individuals and population groups also needs to be pursued.

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Appendix I: Adult Questionnaire

PURE/South Africa

We are very grateful to you for your participation in this study. All information given by you will be held in strict confidence, and will be used for the purpose of this study only after removing any personal identifying information.

Adult Questionnaire

INSTRUCTIONS

Please answer EACH question by marking an X in ONE BOX on each line: (unless otherwise instructed)

X

OR

By writing number(s) in the spaces provided:

1	8

OR

By specifying the answer on the line(s) provided

October 22, 2008

Adult Questionnaire

Subject Initials- **F**= first letter of first name
M= first letter of middle name
L= first letter of last name

3. National I.D#

If not applicable please mark the N/A box

Ethnicity Codes

01 - South Asian (India, Sri Lanka, Pakistan, Bangladesh)

02 - Chinese (China, Hong Kong, Taiwan)

03 - Japanese

04 - Malays

05 - Other Asian (Korea, Malaysia, Papua New Guinea, Thailand, Philippines, Indonesia, Nepal,Vietnam, Cambodia, Laos, Myanmar/Burma, Bhutan, Singapore)

06 - Persian

07 - Arab

08 - Black African

09 - Coloured African (Subsaharan African only)

10 - European

11 - Native North/South American or Australian Aborigine

12 - Latin American (Latino)

13 - Bantu/Semi Bantu

14 - Hemitic/Semi Hemitic

15 - Nilotic/Hausa

16 - Pygmie

17 - Swahili

18 - Other (any other ethnoracial group not listed above)

Subject ID

☐☐ *Centre #* ☐☐☐ *Community#* ☐☐☐ *Household #* ☐☐ *Subject #*

Subject Initials ☐☐☐ *F M L*

Today's date: ☐☐☐☐ *year* ☐☐ *month* ☐☐ *day*

1. **Name:** _____ _____
Given name *Surname*

2. **Not applicable in South Africa**

3. **National identity # or equivalent:** _____ **N/A** ☐

4. **DOB:** ☐☐☐☐ *year* ☐☐ *month* ☐☐ *day* **OR** **Age** ☐☐ yrs

5. **Sex:** ☐ Female ☐ Male

6. **Marital status:** (check one only)

☐ Never married ☐ Currently married ☐ Common law/Living with partner
☐ Widowed ☐ Separated ☐ Divorced

7. **Ethnicity:** ☐☐ → (Please refer to facing page for codes)

8. **Caste/Tribe:** _____

9. **What level of formal education have you completed?** (check highest level only):

☐ None
☐ Primary
☐ Secondary/highschool/higher secondary
☐ Trade School
☐ College/University
☐ Unknown

Adult Questionnaire

11. Occupation

Group 1: Legislators, senior officials and managers

Legislators and senior officials
Corporate managers
General managers
Businessman

Group 2: Professionals

Physical, mathematical and engineering science professionals
Life science and health professionals
Teaching professionals
Other professionals

Group 3: Technicians and associate professionals

Physical, mathematical and engineering-
science associate professionals/technicians
Life science and health associate professionals/technicians
Teaching associate professionals/technicians
Other associate professionals/technicians

Group 4: Clerks

Clerks
Customer service clerks

Group 5: Service workers and shop and market sales workers

Personal and protective services workers
Models, salespersons and demonstrators

Group 6: Skilled agricultural and fishery workers

Market-oriented skilled agricultural and fishery workers
Subsistence agricultural and fishery workers

Group 7: Craft and related trade workers

Extraction and building trade workers
Metal, machinery and related trades workers
Precision, handicraft, printing and
related trades workers
Other craft and related trades workers

Group 8: Plant and machine operators and assemblers

Stationary plant and related operators
Machine operators and assemblers
Drivers and mobile plant operators

Group 9: Elementary occupations

Sales and services elementary occupations
Agricultural, fishery and related labourers
Labourers in mining, construction,
manufacturing and transport

Group 10: Armed forces

Armed forces

Group 11: Homemaker

Housewife/Husbehusband

Subject ID

☐☐ *Centre #* ☐☐☐ *Community#* ☐☐☐ *Household #* ☐☐ *Subject #*

Subject Initials ☐☐☐ *F M L*

10. Not applicable in South Africa

11a) Not applicable in South Africa

b) Please indicate which group best describes your main occupation.
(Please refer to facing page for definitions of groups and instruction manual for detailed definitions)

☐ **Group 1** ☐ **Group 2** ☐ **Group 3** ☐ **Group 4** ☐ **Group 5**
☐ **Group 6** ☐ **Group 7** ☐ **Group 8** ☐ **Group 9** ☐ **Group 10** ☐ **Group 11**

c) Not applicable in South Africa

d) What is your main source of income? _____

If occupation is group 11 (homemaker) go to question 13

12. Are you currently employed?

☐ No → **(answer 12a - 12b)** ☐ Yes → **Go to #13**

a) Are you retired/stopped work from your primary occupation due to old age? ☐ No ☐ Yes

b) Have you stopped working due to illness? ☐ No ☐ Yes

Subject ID

Centre #	Community#	Household #	Subject #
☐☐	☐☐☐	☐☐☐	☐☐

Subject Initials ☐☐☐ (F M L)

13. CURRENT DISABILITY:

		No	Yes
a)	Do you have any problems using your fingers to grasp or handle?	☐	☐
b)	Do you have any trouble walking about?	☐	☐
c)	Do you have any trouble bending down and picking up an object from the floor?	☐	☐
d)	Do you require a walking stick cane/walker to move about?	☐	☐
e)	Do you have any trouble reading or seeing the individual grains of rice/corn on your plate? (with glasses worn)	☐	☐
f)	Do you have trouble seeing a person from across the room? (12 feet/3.5 meters) (with glasses worn)	☐	☐
g)	Do you have trouble speaking and being understood?	☐	☐
h)	Do you have any trouble hearing what is said in a normal conversation?	☐	☐

Subject Medical History

14. Have you experienced any of the following in the last six months?

		No	Yes			No	Yes
a)	Chest pain or tightness with usual activity	☐	☐	i)	Vomiting	☐	☐
If Yes, →	does the pain spread to the back, neck or inner border of arm	☐	☐	j)	Loss of appetite	☐	☐
b)	Breathlessness with usual activity	☐	☐	k)	Painful or bleeding teeth/gums	☐	☐
c)	Cough for at least 2 weeks	☐	☐	l)	Jaundice	☐	☐
d)	Any sputum while coughing	☐	☐	m)	Burning while passing urine	☐	☐
e)	Blood in sputum	☐	☐	n)	Swelling of feet	☐	☐
f)	Wheezing or whistling in the chest	☐	☐	o)	Swelling of face	☐	☐
g)	Early morning cough with chest tightness	☐	☐	p)	Blood in urine	☐	☐
h)	Loose stools/diarrhea for at least 3 days	☐	☐	q)	Involuntary weight loss of > 3kg	☐	☐

15. Not applicable in South Africa

16a) Do you use glasses/spectacles/contact lenses at present? No ☐ Yes ☐

b) Do you use a hearing aid? No ☐ Yes ☐

Adult Questionnaire

Cancer Sites

1= Mouth
2= Esophagus
3= Stomach
4= Small intestine
5= Large intestine including rectum
6= Pancreas
7= Liver
8= Lung
9= Breast
10= Cervical/uterine/ovarian
11= Prostate
12= Head and neck
13= Other, specify

Subject ID

Centre # | Community# | Household # | Subject #

Subject Initials F M L

17. Have you ever been diagnosed with any of the following?(check all that apply)

	No	Yes	#of yrs since diagnosis
a) Diabetes	☐	☐	☐☐
b) Hypertension/ high blood pressure	☐	☐	☐☐
c) Stroke	☐	☐	☐☐
d) Angina/heart attack/ Coronary artery disease	☐	☐	☐☐
e) Heart failure	☐	☐	☐☐
f) Other heart disease	☐	☐	☐☐
g) Hepatitis/Jaundice	☐	☐	☐☐
h) Cancer	☐	☐	☐☐

Please refer to facing page for cancer sites ☐☐ *site*

other, specify _____

	No	Yes	#of yrs since diagnosis
i) COPD	☐	☐	☐☐
j) Asthma	☐	☐	☐☐
k) Tuberculosis	☐	☐	☐☐
l) Malaria	☐	☐	☐☐
n) HIV/AIDS	Not answered ☐	☐	☐ ☐☐

18. Have you been taking any medications regularly (ie. at least once per week) in the last month? ☐ No → **go to 19** ☐ Yes

a) If yes, for what conditions:

	No	Yes
Blood pressure	☐	☐
Cholesterol lowering drugs	☐	☐
Stroke	☐	☐
Diabetes	☐	☐
Asthma	☐	☐
Others	☐	☐ → If Yes, specify _____
Unknown	☐	☐

Adult Questionnaire

18b) If name of medication is unknown, please list as unknown.

Subject ID

Centre #	Community#	Household #	Subject #
☐☐	☐☐☐	☐☐☐	☐☐

Subject Initials ☐☐☐ *F M L*

18b) List all the medications you are currently consuming at least once a week for the last month?

i) _____ ii) _____

iii) _____ iv) _____

v) _____ vi) _____

vii) _____ viii) _____

Men go to question #23

For Women Only (Questions 19 - 22)

19. Are you currently pregnant ? ☐ No ☐ Yes → **Go to #21**

20. Do you still have periods? ☐ No → **(answer 20a)** ☐ Yes → **Go to #21**

a) How many years since you stopped menstruating? ☐☐ years

21. Have you ever used an oral/ injectable contraceptive? ☐ No ☐ Yes

22a) How many live children have you given birth to? ☐☐ Boys ☐☐ Girls

b) Did you breast feed any of your children? ☐ No ☐ Yes

23. Do you wear a helmet when riding a moped/motorcycle?

a) As a driver ☐ No ☐ Yes ☐ Not applicable

a) As a passenger ☐ No ☐ Yes ☐ Not applicable

24. Do you wear a seatbelt when riding in a car/jeep?

a) As a driver ☐ No ☐ Yes ☐ Not applicable

a) As a passenger ☐ No ☐ Yes ☐ Not applicable

Adult Questionnaire

25. Accidents and Injuries

Location of Injury

1= Factory/industrial place
2= Office
3= Agriculture field/farm
4= Home
5= Road
6= Sport/game e.g. track, court, field, etc.
7= Public building
8= Mine/quarry
9= Construction site e.g. building, road-works, etc.
10 = Other

Type of Injury

1= Burns
2= Scalds
3= Fractures
4= Muscle and ligament sprains/tears
5= Cuts and lacerations
6= Bruises and abrasions
7= Suffocation
8= Head injury (where person did not lose consciousness)
9= Head injury (where person lost consciousness for some time)

Subject ID

Centre #	Community#	Household #	Subject #

Subject Initials F M L

25. During the past 12 months, have you had any injuries that were serious enough to limit your normal activities? (check all that apply)

☐ No → **Go to #26** ☐ Yes → **(answer 25a - 25s)**

If yes, please provide details:

Please refer to facing page for Location and Type Codes

Cause of injury			Location	Type	Absence from work or usual activities (Days)
a) Motor vechicle accident (as a passenger)	☐ No	☐ Yes →			
b) Motor vehicle accident (as a pedestrian)	☐ No	☐ Yes →			
c) Struck by an object	☐ No	☐ Yes →			
d) Explosion	☐ No	☐ Yes →			
e) Natural/environmental factors (gales/cyclones/lightning, etc.)	☐ No	☐ Yes →			
f) Suffocation	☐ No	☐ Yes →			
g) Poisoning	☐ No	☐ Yes →			
h) Snake/scorpion bite	☐ No	☐ Yes →			
i) Fall	☐ No	☐ Yes →			
j) Fire/flames, resultant fumes	☐ No	☐ Yes →			
k) Physical assault (gun, kidnapping, etc.)/violent crime	☐ No	☐ Yes →			
l) Domestic violence (beaten by a family member)	☐ No	☐ Yes →			
m) Drowning/submersion	☐ No	☐ Yes →			
n) Hot or corrosive liquids/floods/substances	☐ No	☐ Yes →			
o) Crush injuries (boulders, building materials, etc.)	☐ No	☐ Yes →			
p) Accident caused by machinery	☐ No	☐ Yes →			
q) Attempted suicide	☐ No	☐ Yes →			
r) Armed conflict	☐ No	☐ Yes →			
s) Other(specify) _____	☐ No	☐ Yes →			

Adult Questionnaire

Location of Fractures
1= Hip/pelvis
2= Thigh
3= Leg
4= Forearm
5= Wrist
6= Hand/finger
7= Vertebrae (back)
8= Other

Fractures: In situations where subjects are in a cast and cannot differentiate between ligament tear or fracture, include as fracture only if doctor confirmed it as a broken bone

27c) Tobacco: Regular use is defined as consuming at least one tobacco product per day.

Duration of use:

For those that have consumed tobacco for <1 year, please enter "0"

Subject ID

Centre # | Community# | Household # | Subject #

Subject Initials F M L

26. Have you ever fractured a bone? ☐ No (go to #25) ☐ Yes (if yes, answer a),b) and c)

a) Number of fractures

b) Years since last fracture (yrs)

c) Bone (s) broken in the most recent fracture(if more than 3, list most severe sites) (location) If other, specify

Please refer to facing page for fracture locations

Tobacco

27. Which best describes your history of tobacco use?

a) ☐ Formerly used tobacco products ☐ Currently use tobacco products ☐ **Never used tobacco products** → **Go to #28**

b) At what age did you start? yrs

c) Have you ever regularly used any of the following tobacco products? (check all that apply)

	Average amount/day	Duration (years)	Past users only: When Stopped (years ago)	Past users only: If less than 1 yr (months ago)
(i) Cigarettes (all kinds)	number			
(ii) Beedies	number			
(iii) Cigars	number			
(iv) Pipes	number			
(v) Sheesha/water pipe Hookah	# of times			
(vi) Chewing tobacco	# of times			
(vii) Snuff	# of times			
(x) Dagga				
(xi) Other _____ Specify				

Subject ID

☐☐ ☐☐☐ ☐☐☐ ☐☐

Centre # *Community#* *Household #* *Subject #*

Subject Initials ☐☐☐

F M L

Question 28 to be answered by non-smokers and former smokers only

28. During the past 12 months, have you been regularly (at least once per week) exposed to other people's tobacco smoke?
("Exposed" is defined as a minimum of 5 consecutive minutes, during which you inhale other people's smoke.)

☐ No → **Go to #29** ☐ Yes → Please answer questions **28a**

a) Over the past 12 months, what has been your typical exposure to other peoples smoke?
("Exposed" is defined as a minimum of 5 consecutive minutes, during which you inhale other peoples smoke)

Select ONE only

☐ 1-2 times/week ☐ 3-6 times/week ☐ at least once a day ☐ 2-3 times/day ☐ 4 or more times/day

29. Not applicable in South Africa

Adult Questionnaire

30c) Alcoholic Beverage: Regular use is defined as at least once a month.

Subject ID

Centre # | Community# | Household # | Subject #

Subject Initials F M L

30. Which best describes your history of alcohol use?

a) ☐ Formerly used alcohol products ☐ Currently use alcohol products ☐ **Never used alcohol products** → **Go to #31**

b) At what age did you start? ☐☐ yrs

c) What forms of alcohol have you regularly used? (check all that apply)

Form of Alcohol	Approx. size of one "drink"	Frequency Daily	Weekly	Monthly	Average # of drinks	Duration (years)	Past users only When Stopped (years ago)
(i) Spirits(rum,whisky, gin,vodka etc)	30ml	☐	☐	☐	☐☐	☐☐	☐☐
(ii) Wine	125ml	☐	☐	☐	☐☐	☐☐	☐☐
(vi) Beer	375ml	☐	☐	☐	☐☐	☐☐	☐☐
(vii) Country liquor/arrack/ sugar cane spirit	30ml	☐	☐	☐	☐☐	☐☐	☐☐

d) **At least once a month, do you consume >5 alcoholic drinks/day?** ☐ No → **Go to #31** ☐ Yes

If yes,(i,ii)

i) How many times per month do you consume >5 alcoholic drinks in a day? ☐☐

ii) What is the average number of drinks that you consume each time? ☐☐

31 a) During your longest or nocturnal sleep period, what time do you normally go to bed? ☐☐ : ☐☐ (00:00-23:59)

b) During your longest or nocturnal sleep period, what time do you normally wake up? ☐☐ : ☐☐ (00:00-23:59)

c) Do you usually take naps/siestas? ☐ No ☐ Yes → *Total nap duration* ☐☐☐ mins

35. **Civic organization**: are defined as non-profit, voluntary organization societies, self help groups and clubs.

Religious organization: are defined as different types of formal and informal groups set up on a religious basis.

Subject ID

Centre # | Community# | Household # | Subject #

Subject Initials F M L

32. Are you a member of any of the following:

			How often do you participate in the activities of this group? Per Month	OR	Per Year
(i) Self help group, Co-operative, Social club, Sports club,	☐ No	☐ Yes →	☐☐		☐☐
(ii) Religious Group (e.g: church group, etc.)	☐ No	☐ Yes →	☐☐		☐☐
(iii) Other _____ (Specify)	☐ No	☐ Yes →	☐☐		☐☐

33. Please answer the following: (choose only one option for each)

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
(i) People are generally honest and want to help others.	☐	☐	☐	☐
(ii) If I do nice things for someone, I can anticipate that they will respect me and treat me just as well as I treat them.	☐	☐	☐	☐

34a) The television, radio, newspaper or magazine advertisements help me decide to buy the type of: (choose only one option for each)

					Not Applicable
(i) Cooking oil	☐	☐	☐	☐	☐
(ii) Flour	☐	☐	☐	☐	☐
(iii) Rice/ Maize meal	☐	☐	☐	☐	☐

b) The television, radio, newspaper or magazine advertisements influence whether I buy: (choose only one option for each)

(i) Soft drinks	☐	☐	☐	☐	☐
(ii) Snacks	☐	☐	☐	☐	☐
(iii) Cigarettes	☐	☐	☐	☐	☐
(iv) Alcohol	☐	☐	☐	☐	☐

35. In a difficult situation, whose help can you count on from?(Please see facing page for definitions)

(i) Civic organizations: specify _____

☐ none ☐ little ☐ moderate/average ☐ a great deal

(ii) Religious organizations: specify _____

☐ none ☐ little ☐ moderate/average ☐ a great deal

Subject ID

Centre # | Community# | Household # | Subject #

Subject Initials F M L

36. Have you experienced any of the following events during the last 12 months?

	No response	No	Yes	
(i) Loss of job	☐	☐	☐	
(ii) Retirement	☐	☐	☐	
(iii) Loss of crop/business failure	☐	☐	☐	
(iv) Household break in	☐	☐	☐	
(v) Marital separation/divorce	☐	☐	☐	
(vi) Other major intra-family conflict	☐	☐	☐	→ Please specify _____
(vii) Major personal injury or illness	☐	☐	☐	
(viii) Violence	☐	☐	☐	
(ix) Armed conflict/war	☐	☐	☐	
(x) Death of a spouse	☐	☐	☐	
(xi) Death/major illness of another close family member	☐	☐	☐	
(xii) Other major stress	☐	☐	☐	→ Please specify _____
(xiii) Wedding of family member	☐	☐	☐	
(xiv) New job	☐	☐	☐	
(xv) Birth in the family	☐	☐	☐	
(xvi) Seperation from family	☐	☐	☐	
(xvii) Unavailability of food/ food insecurity	☐	☐	☐	

Subject ID

Centre # | Community# | Household # | Subject #

Subject Initials F M L

37. Please answer the following: (Choose only one option for each)

For the following question, stress is defined as feeling irritable or filled with anxiety, or as having sleeping difficulties as a result of conditions at work or at home.

	No response	Never Experienced Stress	Some Period of Stress	Several Periods of Stress	Permanent Stress
a) How often have you felt stress at work in the last 12 months? (Mark here if not applicable: i.e. no longer working ☐)	☐	☐	☐	☐	☐
b) How often have you felt stress at home in the last 12 months?	☐	☐	☐	☐	☐

38. What level of financial stress have you felt in the last 12 months?

☐ No response ☐ Little/none ☐ Moderate ☐ High/severe

39. During the past twelve months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row?

☐ No ☐ Yes → **If yes, during those times, did you:**

	No response	No	Yes
a) Lose interest in most things like hobbies, work or activities that usually give you pleasure?	☐	☐	☐
b) Feel tired or low on energy?	☐	☐	☐
c) Gain or lose weight?	☐	☐	☐
d) Have more trouble falling asleep than you usually do?	☐	☐	☐
e) Have more trouble concentrating than usual?	☐	☐	☐
f) Think a lot about death (either your own, someone else's, or death in general)	☐	☐	☐
g) Feel down on yourself, no good or worthless?	☐	☐	☐

Subject ID

☐☐ *Centre #* ☐☐☐ *Community#* ☐☐☐ *Household #* ☐☐ *Subject #*

Subject Initials ☐☐☐ *F M L*

40. Please answer the following: (Choose only one option for each)

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
a) I can do most of my regular shopping (food, household necessities, etc.) at stores within easy walking distance (less than 15 minutes) of my home.	☐	☐	☐	☐
b) Walking or bicycling in my neighbourhood is difficult because of the speed and/or amount of traffic.	☐	☐	☐	☐
c) My neighbourhood is generally free from pollution (litter, air pollution and noise pollution).	☐	☐	☐	☐
d) My neighbourhood streets are well lit at night.	☐	☐	☐	☐
e) I can see other people when I am walking in my neighbourhood.	☐	☐	☐	☐
f) I can speak to other people when I am walking in my neighbourhood.	☐	☐	☐	☐
g) There is a high crime rate in my neighbourhood.	☐	☐	☐	☐
h) There is a problem with unattended dogs in my neighbourhood.	☐	☐	☐	☐

Subject ID

☐☐ Centre # ☐☐☐ Community# ☐☐☐ Household # ☐☐ Subject #

Subject Initials ☐☐☐ F M L

40a) Please answer the following: (Please check all that apply)

i) Has your household been a victim of the following crime(s) in the last 12 months?

	No	Yes
1. Armed robbery	☐	☐
2. Violent attacks	☐	☐
3. Murder	☐	☐
4. Vehicle hijacking	☐	☐
5. House breaking	☐	☐
6. Theft	☐	☐
7. Rape	☐	☐
8. Women abuse eg. (beat,swear-words,sexual) please specify _____	☐	☐
9. Child abuse eg. (burn,swear-words,rejection) please specify _____	☐	☐
10. Child sexual abuse	☐	☐
11. Other, please specify _____	☐	☐

ii) Do you think that crime in your area has increased in the past 5 years? ☐ No ☐ Yes

if yes, which of the following crime(s)?

- ☐ Armed robbery
- ☐ Violent attacks
- ☐ Murder
- ☐ Vehicle hijacking
- ☐ House breaking
- ☐ Theft
- ☐ Rape
- ☐ Women abuse
- ☐ Child abuse
- ☐ Child sexual abuse
- ☐ Other, please specify _____

Subject ID

Centre #	Community#	Household #	Subject #
☐☐	☐☐☐	☐☐☐	☐☐

Subject Initials ☐☐☐ (F M L)

40b) Questions on HIV:

i) Do you know people who have HIV/AIDS? ☐ No ☐ Yes

if yes, which of these people: (please mark all that apply)

- ☐ Your children
- ☐ Your grandchildren
- ☐ Your spouse
- ☐ Your family members
- ☐ Your friends
- ☐ People in the community

ii) What would you consider the mean age of the people who are ill/have died of HIV/AIDS?

- ☐ Younger than 10 years
- ☐ Between 11-20 years
- ☐ Between 21-30 years
- ☐ Between 31-40 years
- ☐ Between 41-50 years
- ☐ Over 50 years

iii) If someone in your household is HIV positive, who is the primary caregiver?

- ☐ Spouse
- ☐ Parents
- ☐ Family member
- ☐ Child.children
- ☐ Friends
- ☐ Volunteer

40c) Do you care for any orphans in your family? ☐ No ☐ Yes

Adult Questionnaire

42b) Health History:

Cancer Sites

1= Mouth
2= Esophagus
3= Stomach
4= Small intestine
5= Large intestine including rectum
6= Pancreas
7= Liver
8= Lung
9= Breast
10= Cervical/uterine/ovarian
11= Prostate
12= Head and neck
13= Other, specify

Subject ID

Centre #	Community#	Household #	Subject #
☐☐	☐☐☐	☐☐☐	☐☐

Subject Initials ☐☐☐ (F M L)

41. How long would it take you to get from your house to the nearest facility if you walked?

	Minutes	Don't know		Minutes	Don't know
i) grocery/convenience store	☐☐☐	☐	iv) video store	☐☐☐	☐
ii) bank	☐☐☐	☐	v) non-fast food restaurant	☐☐☐	☐
iii) post office	☐☐☐	☐	vi) fast food restaurant	☐☐☐	☐

42a) Total number of siblings ☐☐

b) Health History: Complete for all parents and siblings, alive or dead

	Father			Mother			Siblings			# of siblings with the condition
	Unknown	No	Yes	Unknown	No	Yes	Unknown	No	Yes	If yes
Diabetes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐☐
Coronary Heart Disease	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐☐
High Blood Pressure	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐☐
Stroke	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐☐
Cancer (Please refer to facing page for cancer sites)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐☐
if Yes, indicate site	☐☐			☐☐			☐☐			
	Other, Specify			Other, Specify			Other, Specify			

Adult Questionnaire

If subject refuses to provide any of the measures, enter a value of "0" into each of the boxes for that question

For more detailed instructions please refer to the instruction manual

Subject ID

Centre # | Community# | Household # | Subject #

Subject Initials F M L

43. Physical Measurements

Sitting
a) Right arm blood pressure
#1 Systolic ____ Diastolic ____ mmHg
#2 Systolic ____ Diastolic ____ mmHg

b) Heart Rate
#1 ____ beats/min
#2 ____ beats/min

c) Waist
#1 ____.__ cm → ☐ minimal/no clothing ☐ full clothing
#2 ____.__ cm

d) Weight ____.__ kg → ☐ minimal/no clothing ☐ full clothing

e) Hip
#1 ____.__ cm → ☐ minimal/no clothing ☐ full clothing
#2 ____.__ cm

f) Height ____.__ cm (without shoes)

44a) Circumference of mid upper right arm: ____.__ cm

b) Circumference of right calf: ____.__ cm

c) Head Circumference: ____.__ cm

Subject ID

Centre #	Community#	Household #	Subject #
☐☐	☐☐☐	☐☐☐	☐☐

Subject Initials ☐☐☐ (F M L)

47. Grip Strength (Maximal contraction):

a) Non-dominant hand:	#1	☐☐ kg.	b) Dominant hand:	#1	☐☐ kg.
	#2	☐☐ kg.		#2	☐☐ kg.
	#3	☐☐ kg.		#3	☐☐ kg.

Adult Questionnaire

If subject refuses to provide any of the measures, enter a value of "0" into each of the boxes for that question

For more detailed instructions please refer to the instruction manual

48. Spirometry:

American Thoracic Society criteria for acceptable spirograms:
Spirograms are acceptable if they are free from:

1. **Cough during exhalation**
2. **Early termination or cut-off**
3. **Variable effort**
4. **Leaks**
5. **Obstructed mouth piece**

Subject ID

Centre #	Community#	Household #	Subject #
☐☐	☐☐☐	☐☐☐	☐☐

Subject Initials ☐☐☐ (F M L)

48. Spirometry:

a) FEV1 (Litre): **#1** ☐.☐☐ **#2** ☐.☐☐ **#3** ☐.☐☐

b) Does FEV1 obtained meet ATS criteria?

☐ No → (answer (i) to (iii)) ☐ Yes → Go to **c)**

Reasons for not meeting the ATS criteria: (check all that apply)

i) Cough ☐

ii) Values not within 0.2L of each other ☐

iii) Less than 3 values ☐

c) FVC (Litre): **#1** ☐.☐☐ **#2** ☐.☐☐ **#3** ☐.☐☐

d) Does FVC obtained meet ATS criteria?

☐ No → (answer (i) to (iii)) ☐ Yes → Go to **e)**

Reasons for not meeting the ATS criteria: (check all that apply)

i) Cough ☐

ii) Values not within 0.2L of each other ☐

iii) Less than 3 values ☐

e) PEFR (Litre/min): **#1** ☐☐☐ **#2** ☐☐☐ **#3** ☐☐☐

f) Does PEFR obtained meet ATS criteria?

☐ No → (answer (i) to (ii) ☐ Yes → Go to **Q#47**

Reasons for not meeting the ATS criteria: (check all that apply)

i) Cough ☐

ii) Less than 3 values ☐

UNIVERSITY of the
WESTERN CAPE

Subject ID

Centre #	Community#	Household #	Subject #

Subject Initials ☐☐☐ (F M L)

49. **Not applicable in South Africa**

50. **ECG obtained?** No ☐ → **Go to #51** Yes ☐

a) 2 0 ☐☐ (year) ☐☐ (month) ☐☐ (day) → Place ECG :File Label Here

b) **Please print ECG label #:** ☐☐☐☐☐☐

51 a) **Blood sample obtained?** No ☐ → **Go to #52** Yes ☐

b) ☐ Fasting sample ☐ Non-fasting sample

c) 2 0 ☐☐ (year) ☐☐ (month) ☐☐ (day) **Time** ☐☐ : ☐☐ (00:00-23:59) → **Hours since any food/beverage consumed (excluding water)** ☐☐

d) **Please print Blood label #:** ☐☐☐☐☐☐ Place Blood label here

52 a) **Urine sample obtained?** No ☐ → **Go to #53** Yes ☐

b) ☐ Fasting sample ☐ Non-fasting sample

c) **Please print Urine label #:** ☐☐☐☐☐☐ Place Urine label here

53. **Name of Interviewer:** *(please print)* _____ (First Initial) _____ (Last Name) **Interviewer Code:** ☐☐☐

Appendix II: Household Questionnaire

PURE/South Africa

To be completed by a knowledgable household member

We are very grateful to you for your participation in this study. All information given by you will be held in strict confidence, and will be used for the purpose of this study only after removing any personal identifying information.

Household Questionnaire

INSTRUCTIONS

Please answer EACH question by marking an X in ONE BOX on each line: (unless otherwise instructed)

X

OR

By writing number(s) in the spaces provided:

1 8

OR

By specifying the answer on the line(s) provided

July, 2007

Household Questionnaire

Subject Initials- **F**= first letter of first name
M= first letter of middle name
L= first letter of last name

Household ID

☐☐ ☐☐☐ ☐☐☐
Centre # *Community #* *Household #*

Subject Initials ☐☐☐
F M L

Today's date: ☐☐☐☐ ☐☐ ☐☐
year month day

Type of House

1. Type of roof on the main house (check one only)

☐ Thatch ☐ Tiles ☐ Reinforced concrete ☐ Slate ☐ Fibrocement sheets/carton sheets

☐ Galvanized iron sheets ☐ Asbestos sheets ☐ Other _____

2 a) Does the house have electricity? ☐ No ☐ Yes

b) Primary fuel used for cooking (check one only)

☐ Kerosene ☐ Charcoal ☐ Coal ☐ Gas ☐ Wood ☐ Agriculture/crop

☐ Electricity ☐ Animal dung ☐ Shrub/grass ☐ Other _____

c) Primary heating source during the cold/rainy season (check one only)

☐ Coal open fire ☐ Wood open fire ☐ Gas furnace ☐ Portable heater

☐ None ☐ Electricity ☐ Other _____

Water Facilities

3a) Primary drinking water source (check one only)

☐ Household well ☐ Community well ☐ Bore well ☐ Hand pump ☐ Collected rain water

☐ Artificial tank ☐ Natural lake ☐ River ☐ Piped water ☐ Bottled/packaged water

b) If house does not have water facilities, how long does it take to get water?
(Include time it takes from leaving your home, getting the water, and returning again)

☐ <5 minutes ☐ 5-30 minutes ☐ 30-60 minutes ☐ 60-90 minutes ☐ >90 minutes

Household Questionnaire

Household income

7a) For income document only gross income (the entire amount of income before any deductions are made) for employed subjects.

Question 10b)

Partially open to outside is defined as: not fully enclosed within the house

Household ID

☐☐ ☐☐☐ ☐☐☐
Centre # *Community #* *Household #*

Subject Initials ☐☐☐ *F M L*

Labour and Time Saving Devices

4. Does the household own any of the following? (check all that apply)

☐ Moped/motorbike ☐ Car/jeep → # owned ☐ ☐ Other four-wheeler/tractor ☐ Bicycle

☐ Livestock cart ☐ Computer → # owned ☐ ☐ Washing machine ☐ Kitchen mixer

☐ Refrigerator ☐ TV → # owned ☐ ☐ Stereo/transistor/radio ☐ Telephone

5a) Do you wear a helmet when riding a moped/motorcycle? ☐ No ☐ Yes

b) Do the members of your family wear a helmet when riding a moped/motorcycle? ☐ No ☐ Yes

6a) Do you wear seatbelts when riding in a car/jeep? ☐ No ☐ Yes

b) Do the members of your family wear a seatbelt when riding in a car/jeep? ☐ No ☐ Yes

Household Income

7 a) Current average monthly household income: _____

b) How much money is spent in one month on food for the entire household? _____

8 a) Does the household own any cultivable land? ☐ No ☐ Yes → **(answer 8b)**

b) How much cultivable land does the household own?: ☐☐☐☐.☐ ☐ acres ☐ hectares ☐ Sq meters

Household Ventilation

10a) Where is the cooking for the household done? (check all that apply)

☐ Inside the house ☐ Outside the house ☐ Both

10b) If you have an inside cooking area, does it have any of the following? (check all that apply)

☐ Window ☐ Chimney ☐ Exhaust ☐ Partially open to outside

11. On average, how many months per year do you cook outside? ☐☐
(If less than 1 month, please enter **01**)

Household ID

☐☐ ☐☐☐ ☐☐☐
Centre # *Community #* *Household #*

Subject Initials ☐☐☐
F M L

12. Please read the following statements and mark the most appropriate choice

a) How often does it happen that you do not have enough food which you and your family need? And how often did this happen within the last 5 years?

	All the time	Often	Sometimes	Rarely	Never
Present(within last 4 weeks)	☐	☐	☐	☐	☐
Within the last 5 years	☐	☐	☐	☐	☐

b) How often does it happen that you do not have enough money for clothing which you and your family need? And how often did this happen within the last 5 years?

	All the time	Often	Sometimes	Rarely	Never
Present(within last 4 weeks)	☐	☐	☐	☐	☐
Within the last 5 years	☐	☐	☐	☐	☐

c) Do you have difficulties with paying bills? (for housing, electricity, heating etc)? And how often did this happen within the last 5 years?

	All the time	Often	Sometimes	Rarely	Never
Present(within last 4 weeks)	☐	☐	☐	☐	☐
Within the last 5 years	☐	☐	☐	☐	☐

13. Name of Interviewer: _____ _____ **Interviewer Code:** ☐☐☐
(please print) *First Initial* *Last Name*