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Olamijuwon, Emmanuel Olawale (2017) The relationship between social cohesion and the health status of adults in South Africa, University of the Witwatersrand, Johannesburg, <https://hdl.handle.net/10539/24551>

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THE RELATIONSHIP BETWEEN SOCIAL COHESION AND THE HEALTH STATUS OF ADULTS IN SOUTH AFRICA.



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A RESEARCH REPORT SUBMITTED TO THE SCHOOLS OF PUBLIC HEALTH AND SOCIAL SCIENCES, UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS IN THE DEMOGRAPHY AND POPULATION STUDIES

JUNE, 2017

DECLARATION

I, **Emmanuel Olawale Olamijuwon**, declare that this research report is my original work. This research work is being submitted for the degree of Masters in Demography and Population Studies at the University of the Witwatersrand, Johannesburg. To the best of my knowledge, this work has not been submitted for any degree or examination or to any other university.



8th day of June 2017

ACKNOWLEDGEMENTS

My sincere gratitude is extended to the following people:

- My family, most especially my Mum, Mrs Eunice Olamijuwon for her support.
- My supervisor, Professor Clifford Odimegwu, for his guidance, encouragement, and undying support during the course of my study in South Africa. His expertise, insight and understanding have contributed substantially to an excellent postgraduate experience. In the past few years, I have learnt a lot from him, and forever they will be treasured.
- Staff and doctoral students of the Demography and Population Studies programme of WITS University. Your support and inputs in this research have equipped me with an unquestionable knowledge I would need to succeed as a demographer.
- My colleagues at the Demography and Population Studies Programme at Wits University, I would also like to appreciate for their advice and support.
- I would like to thank the Human Sciences Research Council (HSRC) for providing me access to the dataset used in this study.

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CHAPTER ONE

INTRODUCTION

1.1 Background

Although universal coverage for health care (UCH) has gained acceptance both nationally and globally, South Africa (RSA) confronts a relentless burden of infectious and non-infectious diseases. Coupled with this are high levels of HIV, injuries, maternal and child health issues (WHO, 2010; Norman et al., 2006). Persisting social disparities and inadequate resources to provide for the growing population are known to be contributing factors (Mayosi *et al.*, 2012; Whiteside & Sunter, 2000). While notable progress has been made in improving treatment outcomes for some diseases, RSA still confronts an enormous burden of tuberculosis (TB) which is rated worst in the world (Churchyard *et al.*, 2014; Mayosi & Benatar, 2014).

Driven by the spread of HIV infection, the incidence of TB has increased from about 300 per 100,000 persons in the early 90s to more than 600 per 100,000 in the early 2000s and more than 950 per 100,000 in 2012 (Mayosi & Benatar, 2014). South Africa also reports the most extensively drug-resistant TB cases in the world with about five-fold increase in annual notifications between 2005 and 2012 (Gandhi *et al.*, 2006; World Health Organization, 2013). Current projections by the World Health Organization also indicate that by 2020, infectious diseases will be the leading cause of death in low-income countries while non-communicable diseases will dominate in high or middle-income countries including South Africa (World Health Organization, 2013).

Global interventions to address this problem has however ranged from promoting prevention strategies and strengthen health services by the United Nations General Assembly to proposing new global interventions to attend to the increasing worldwide burden.

An appropriate response to the RSA health care challenges is perceived to be by addressing the social determinants of health (SDH) which lie outside of the health system while also strengthening the health care system and facilitating the (UCH) care (Krech, 2011). Social cohesion, defined as the extent to which people are included in social relations incoherent, constructive and productive ways is also perceived to be a valuable prism through which insights into how RSA and its health system functions can be gained (Stanley, 2003). This construct which in various operationalizations encompasses trust, social support, tolerance and quality and quantity of social connections is becoming one of the neighbourhood attributes that are increasingly being recognised as relevant internationally (Gilbert *et al.*, 2013; Kawachi *et al.*, 1997; Pearce & Davey, 2003). This is because the construct compared to other social determinants reflects the individual's perception of where they live and the people around them. Research has also shown that how one perceives their local environment in terms of housing and neighbourhood quality may be substantial for health (Sooman & Macintyre, 1995).

However, RSA in recent times has shown evidence of weak social cohesion in terms of high racial and gender discrimination, vast income inequalities, extreme violence, criminal victimisation and not until recently was social cohesion identified as a key for nation building (Coovadia *et al.*, 2009; National Planning Commission, 2012). For instance, the most recent estimate of South Africa's Gini coefficient of income inequality is 63.4 which is about the highest in the world (World Bank, 2011). There are also issues of declining public confidence in RSA political institutions and the state performance coupled with low levels of interpersonal trust, xenophobic attacks on migrants and the straining of family and community safety (Presidency, 2008).

The effect of the apartheid era on population health through its policies has also permeated every aspect of social life with its effect still felt till date (Walker, Reid, &

Cornell, 2004). The majority of the health-care problems currently faced in the country currently are perceived to be resulting from apartheid policies which entrenched and enforced in rural-urban migration and led to the spread of squatter camps and informal settlements in towns and cities of RSA (Walker *et al.*, 2004). Yawning divides in resource allocation can certainly provide insights into the disparity in health care access whereby African communities were characterised by inadequate water supply and sanitation (Walker *et al.*, 2004; Whiteside & Sunter, 2000). Hospitals and clinics in the African communities during this era were also under-resourced, understaffed and unable to cope with increasing demand which was largely not happening in white communities (Walker *et al.*, 2004). About 15% of the population has access to private health care while the remainder, majority of whom are blacks depend on the already overstretched public health system (Ijumba, Day, & Ntuli, 2003). All of these calls for an urgent redress if significant progress is to be made in improving the health status of adults in the country.

While significant efforts has been made by researchers in developed countries to examine the connection between social cohesion and health, African researchers has been silent over years in part because of the unavailability of data from which to measure social cohesion (Macintyre & Ellaway, 2000; Mair *et al.*, 2009; Martin *et al.*, 2010; Mulvaney-Day, Alegría, & Sribney, 2007; Rios, Aiken, & Zautra, 2011; Robinette *et al.*, 2013). Although there has been an attempt by Peltzer and colleagues to examine the health benefits of social cohesion, his construct moreorless examined only social participation construct of social capital (Peltzer, 2012; Peltzer & Phaswana-Mafuya, 2013). Other available evidence had only considered the association of health with other social determinants of health like social capital and income inequalities, but rarely has its relationship with social cohesion been considered (Cramm, Dijk, & Nieboer, 2013; Mkhonto, Labadarios, & Mabaso, 2012).

To inform policy on the potential role of social cohesion for improving the health status of adults in South Africa, this study assessed the association between social cohesion and health status of adults in South Africa. In South and globally, previous studies have shown that all societies have social gradients in health such that wealthier individuals have better health outcomes (Marmot, 2004, 2005; Marmot & Bell, 2012). At the same time, racial categories in South Africa appears to be an indication of wealth status (Marmot, 2004). As a result, this study provides a nuanced understanding of the relationship between social cohesion and health by examining if the observed relationship differs by race. Findings from this study are expected to draw attention to the under-explored factor that might have been contributing to the poor health status of adults in South Africa.

1.2 Statement of the Problem

South Africa like other middle and high-income countries is currently undergoing a demographic transition with declining fertility. Although reports suggest that life expectancy has increased from 52 years in 2005 to 61 years, the health status is poor compared with other middle-income countries most especially among the black majority (Benatar, 2013). The poor health status is due to the triple burden of disease which has been exacerbated by the TB and HIV/AIDS epidemic resulting in high child and young adult mortality.

Further delay in tackling poor health conditions, however, has enormous impacts on health care demands, individuals and subsequently severe social and economic implications for South Africa due to the extended and debilitating attributes of the disease, as well as the stigma associated with the illness. First, as a result of poor health status, the public health sector is pressured to deliver services to about 80% of the

population (Ijumba *et al.*, 2003). The growing burden of both the multi-drug resistant TB (MDR-TB) and the emergence of extensively drug-resistant (XDR) TB in 2006 also adds to the burden of already overstretched health services which may be caused by incomplete or inadequate treatment of TB both of which continues to present a challenge as attempts are made to address the high rates of TB in South Africa. Similarly, approximately 7.03 million persons were estimated to be living with HIV in South Africa an increase of about 31% from the previously estimated 5.38 million in 2011 (Statistics South Africa, 2011, 2016). About 203,000 persons were also estimated to had lost their lives to it (Shisana *et al.*, 2014; Statistics South Africa, 2016). Poor health status has also been observed to be associated with depression in most instances (Peltzer *et al.*, 2015).

Those inflicted with a disease in South Africa are often stigmatised which may also lead to shame, isolation, and a distancing from appropriate health services (Earnshaw *et al.*, 2015). They are also significantly less productive than healthy individuals because of the high number of active years lost during the illness. For instance, in 2011, non-communicable diseases alone accounted for 34.4% of years of life lost while about 381,000 years of potential life lost annually to tuberculosis (StatSA, 2014). This is also evident in previous studies that have observed a strong relationship between the high incidence of TB and low gross national per capita income.

Poor health status at times also results in loss of wages due to the inability to work and the costs associated with diagnosis, care, and treatment thereby forcing healthy family members to work harder and longer in an attempt to make up for the financial burden of such a disease condition (Xie, 2015).

In order to contribute information that may be useful in reversing the health challenges faced in the country, this study, therefore, examined the association between social

cohesion and the health status of adults in South Africa. The study also draws attention to the unexplored factor that might help improve the health status of adults in RSA.

1.3 Justification

Adults of working age are crucial for the development of every nation because of their significant contribution to the economic growth of the country. Poor health status among adults, however, results in a diminished labour capacity leaving little room for economic growth and gross domestic product expansion that a low to a middle-income country such as South Africa so desperately needs. As a result, a health-based study of adults in South Africa particularly in relation to social cohesion which has been largely ignored is important for the overall future development of the nation. This is especially important since social cohesion is becoming one of the neighbourhood attributes that are increasingly being recognised as relevant internationally (Gilbert et al., 2013; Kawachi et al., 1997; Pearce & Davey, 2003). Findings from this study are expected to inform policy interventions aimed at addressing a crucial social determinant of health and contribute towards achieving the Sustainable Development Goal 3. Achieving this goal would imply that by 2030, South Africa would have been able to improve the mental health and well-being of all persons in the country. Specifically, findings from the study are expected to contribute significantly towards the achievement of the South Africa Policy on Quality in Health Care such that South Africa would be able to reduce the underlying causes of injury, illness, and disability through preventive and health promotion activities. Awareness of the nexus between social cohesion and health status is also expected to contribute significantly towards the achievement of the 1994 National Health Plan for South Africa

1.4 Research Question:

Is there a relationship between social cohesion and health status of adults in South Africa?

Sub-Questions:

1. What is the health status of adults in South Africa?
2. What is the health status of adults in South Africa according to social cohesion, socio-economic and demographic characteristics?
3. What is the association between social cohesion and health status of adults in South Africa while controlling for other characteristics?
4. How does the association between social cohesion and health status of adults in South Africa vary across racial groups while controlling for other characteristics?

1.5 Research Objective:

The general purpose of this study is to explore the relationship between social cohesion and health status of adults in South Africa.

Sub-Objectives: The specific objectives of this research are to examine and describe:

1. The health status of adults in South Africa;
2. The health status of adults in South Africa according to social cohesion, socio-economic and demographic characteristic;
3. The relationship between social cohesion and health status of adults in South Africa while controlling for other characteristics;
4. Tthe relationship between social cohesion and health status of adults in South Africa across racial groups while controlling for other characteristics.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents the review of relevant literature and the theoretical framework that underpins this study. Relevant literature related to the study were collected through Google search engine, Google Scholar, JSTOR, PubMed, ResearchGate, and reports. Access to some of the articles was secured through the University of the Witwatersrand's Library. Keywords and mesh terms for literature search included: social or neighbourhood cohesion, and health or self-rated health. Studies were included if they examined the relationship between social cohesion and health of adults while studies of older adults or elders were excluded.

Studies on the social determinants of health have yielded different findings. Thus, in order to properly engage previous researches relevant to this study, this chapter was presented under two sub-headings: social cohesion and health status, and other determinants of health. A tabular presentation of some of the reviewed articles as well as their measure of health status and social cohesion are presented in **Appendix B**.

2.1 Social Cohesion and Health Status

There has been much research on the relationship between social cohesion and self-rated health status and other constructs of health such as depression, diabetes, stress, hypertension and others. However, much of the research to date has mainly been undertaken in high-income countries, in part because of the non-availability of data.

About self-rated health, a study of adults in Maastricht, Netherlands revealed that both individual-level and neighbourhood level social cohesion were significantly associated with self-rated (Putrik *et al.*, 2015). Their findings suggest after adjusting for age, gender

and socio-economic status, more social cohesion in the neighbourhood was associated with lower odds of having poor self-rated health (Putrik *et al.,* 2015).

Applying a multilevel structural equation model, a study in the United States also observed that greater social cohesion was associated with better self-rated health among adults (Moorman, Stokes, & Morelock, 2016). Although the study included older adults above 65 years (Moorman *et al.,* 2016). These findings are also supported by another study of Hispanics and non-Hispanic adults in Arizona, USA where higher neighbourhood cohesion was found to be significantly associated with higher self-rated health status (Rios *et al.,* 2011). Although the study underrepresented Hispanic, male, young adult, and less educated residents which limited the generalizability of the findings, they highlighted that the enhancement of collective efficacy in neighbourhoods with higher social cohesion is likely to improve health (Rios *et al.*, 2011). The authors argued further that cohesive neighbourhoods are likely to foster healthy lifestyle behaviours such as safe public spaces for activity, clean and safe housing, and availability of nutritional foods (Rios *et al.*, 2011). Social cohesion may also be beneficial for self-rated physical and mental health as it is likely to foster a sense of community, which is considered to be an affective component of social cohesion (Rios *et al.*, 2011).

Another ecological and multilevel study of adults in Japan where both individual and community-level social cohesion was observed to be significantly associated with improvements in self-rated health status (Fujisawa, Hamano, & Takegawa, 2009). Their findings suggest that individuals in communities with higher levels of social cohesion were more likely to report good health (Fujisawa *et al.,* 2009). Moreover, using a repeated cross-sectional data from the Dutch housing survey collected by the Statistics Netherlands, a study of adults in the Netherlands showed that social cohesion was significantly associated with better health (Ruijsbroek *et al.,* 2016). Their findings

suggest that greater deterioration of social cohesion was associated with more people reporting poor general health while improvements in social cohesion were significantly related to fewer people reporting poor general health (Ruijsbroek *et al.*, 2016). The health effects of improved social cohesion were however studied within a short period which could have biased the study findings (Ruijsbroek *et al.*, 2016). Social cohesion has also been observed to be significantly linked with self-rated health among adults in West of Scotland (Macintyre & Ellaway, 2000).

A study of Latinos in the United States, however, observed that neighbourhood social cohesion was not significantly associated with either self-rated physical or mental health after accounting for the role of the other social connection variables (Mulvaney-Day *et al.*, 2007). The authors posited that understanding the role of language as a marker for acculturation and as a mechanism for accessing health resources may require a more refined investigation through a qualitative approach (Mulvaney-Day *et al.*, 2007).

The relationship between social cohesion and other health indicators such as mental health and among other things depression, obesity, hypertension, stress and psychological distress has also been well researched using community, neighbourhood and individual-level data. For instance, a population-based cohort study of adults in the UK aged 18years or older found that resident in medium and high cohesion neighbourhoods compared to low cohesion neighbourhoods were significantly associated with improvements in mental health (Fone *et al.*, 2014). Their finding was also consistent with another study in Glasgow, United States (Ellaway, Macintyre, & Kearns, 2001). This suggests that high levels of neighbourhood social cohesion based on friendships, visiting and borrowing and exchange of favours with neighbours may facilitate access to networks and services that may help improve mental health (Fone *et al.*, 2014; Kawachi & Berkman, 2000). A study of adults in Maastricht, the Netherlands observed that both

neighbourhood and individual perception of social cohesion were associated with lower odds of depressive symptoms (Putrik *et al.,* 2015). This finding is also consistent with another study of adults in Chicago where greater social cohesion was associated with lower levels of depressive symptoms (Mair, Diez Roux, & Morenoff, 2010). Living in less socially cohesive neighbourhoods in six communities in the US were also significantly associated with increased risk of depression among adults (Echeverría *et al.,* 2008).

More recently, another study of adults in six cities in the USA also observed that both individual level and neighbourhood aggregates of social cohesion were significantly associated with lower risk of depression although their study excluded adults under 45 years (Moore *et al.,* 2016). Accordingly, a study of Hispanic and non-Hispanics in the metropolitan Phoenix, Arizona observed that within neighbourhoods, individual ratings of NSC, relative to averages of social cohesion within the neighbourhood, were associated with higher self-rated health and lower psychological distress (Rios *et al.*, 2011). These findings suggest that social cohesion within a neighbourhood may help residents exert social control, which can provide more support between neighbours, reduce the number of stressors that residents perceive to exist within the neighbourhood, and buffer or mitigate the stressors which do occur (Ahern & Galea, 2011). Social cohesion between residents may foster communication—which can keep residents knowledgeable about their community— improve the local services and resources that are available, and increase a personal sense of control, which in turn, can alleviate depressive symptoms (Stafford, McMunn, & De Vogli, 2011).

Among Latinos in South and West Bronx, New York, perceptions of social cohesion in the neighbourhood were also found to be significantly associated with lower levels of depressive symptomology (Chambers *et al.,* 2015). Their findings corroborate findings

from other studies as high social cohesion reflect communities that are more supportive of overall well-being and characterised by lower crime rates, more civic participation, and better access to health care among others (Berkman & Kawachi, 2000; Chambers *et al.*, 2015). The only available study in Africa also showed that Egyptian patients with systemic lupus erythematosus had increased risk of depression if they perceived poor neighbourhood social cohesion (Abdul-Sattar & Abou El Magd, 2014). Other studies in six communities in the US, and adults with self-reported arthritis in North Carolina as well as adults living in England although these studies were restricted to adults above 40 years in most instances (Echeverría *et al.*, 2008; Martin *et al.*, 2010; Stafford *et al.*, 2011).

In relation to psychological distress, studies of four largest Dutch cities showed that more considerable neighbourhoods were associated with lower psychological distress (Erdem *et al.*, 2016; Erdem *et al.*, 2015). A study in Pittsburgh, Pennysylvia, however, observed no significant relationship after adjusting for age, employment and other socioeconomic and demographic characteristics (Flórez *et al.*, 2016).

The relationship between social cohesion and other aspects of mental health which includes body mass index, hypertension, diabetes, and obesity has also been well documented. Among South Asians living in the US, hypertension and type 2 diabetes were significantly associated with high tertile neighbourhood social cohesion, but the relationship disappeared after controlling for socioeconomic, psychosocial and physiological characteristics (Lagisetty *et al.*, 2015). Similarly, a European SPOTLIGHT study of five urban regions found that individuals in the highest quartile of social networks or social cohesion had approximately lower odds of obesity than adults in the lowest quartile (Mackenbach *et al.*, 2016)

Consequently, individual perceptions of social cohesion among Brazilian adults was significantly associated with a reduced risk of all-cause mortality as well as mortality

from cardiovascular disease (Pattussi *et al.*, 2016). Their finding also showed that community social cohesion was not associated with mortality risk (Pattussi *et al.*, 2016). Social cohesion has also been identified as a potential pathway through which neighbourhood poverty might influence the mental health of Latinos, but the study only focused on two neighbourhood structural contexts neglecting the possible role of others (Hong, Zhang, & Walton, 2014).

In spite of the tremendous efforts in exploring this relationship, much remains to be studied in the sub-Sahara Africa region as a bulk of the previous researches has been concentrated in developed countries. For instance, in South Africa, the only evidence on the relationship between social cohesion and health status has been limited to older adults aged 50 years or older (Peltzer, 2012; Peltzer & Phaswana-Mafuya, 2013). Although findings from the study highlighted that there is no significant relationship between social cohesion and the risk of depression among adults age 50 years or older, the construct of social cohesion used in the study measured only participation in social groups which was more or else related to social capital. The study was prone to recall, selection and survival biases (Peltzer, 2012; Peltzer & Phaswana-Mafuya, 2013).

Given that poor health status has negative implications on health care demands and subsequently severe consequences on the development of South Africa, this study examines the relationship between social cohesion and health status of adults living in South Africa. Similarly, because race has been shown to determine health status in terms of social gradient, this study examined this relationship across racial groups. Findings from this study are expected to contribute to public understanding and lead to the formulation of appropriate and adequate policy interventions towards addressing the underlying factors that may help improve the health status of adults in South Africa.

2.2 Other Determinants of Health

Significant attempts has also been made to explore other possible determinants of health such as socio-demographic characteristics and other SDH like social capital, income inequality among others (Beaudoin, 2009; Chen *et al.*, 2015; Cramm *et al.*, 2013; Fone *et al.*, 2014; Webber, Huxley, & Harris, 2011). For instance, a cross-sectional study of U.S. ethnic groups observed racial differences in self-rated health (Beaudoin, 2009). Their study found that health status was much better for Whites than Latinos and also for people who are younger, with higher income, higher education, and lower body mass index although the study was subject to a low response rate and selection bias (Beaudoin, 2009). These findings were also consistent with another recent survey of older adults which found individual level characteristics such as education, income and social capital were significant predictors of well-being among older adults (Cramm *et al.*, 2013). They also found that neighbourhood characteristics such as neighbourhood security, neighbourhood services, and neighbourhood social capital were significantly linked to the well-being of older adults but found no significant relationship found between well-being and gender, age or marital status (Cramm *et al.*, 2013). Their findings also suggest that neighbourhood security and social capital were potential mediators between marital status, income, and well-being among older adults although the reliability and validity of these findings could have distorted as a result of poor response rate (Cramm *et al.*, 2013). Inoue and others also observed that females compared to males were at higher risk of all-cause mortality both at individual and community level and a year increase in age increases mortality risk (Inoue *et al.*, 2013). This finding is also consistent with a more recent study that found age to be significantly related to subjective sense of health among older adults in Southern Taiwan (Chen *et al.*, 2015).

Consequently, compared to remaining in employment, a population-based longitudinal study found that a decrease in mental health score was strongly associated with the transition to economic inactivity or remaining economically inactive (Fone *et al.*, 2014). The decline in mental health was also related to remaining in low-value housing, remaining or becoming a low-income or non-owner occupied household, and remaining or becoming in poor physical health (Fone *et al.*, 2014). Their findings also suggest that moving to a higher, lower or same level of neighbourhood deprivation compared to not moving at all was slightly associated with change in mental health although their study was subject to loss of follow-up, selection bias and the potential confounding effect of two-wave longitudinal study (Fone *et al.*, 2014). Similarly, Mulvaney-Day and colleagues in their study observed that age, sex, education, income, and language were strong predictors of self-rated physical health and associations with social connection scales were only manifest when these variables were not entirely controlled for (Mulvaney-Day *et al.*, 2007). However, Peltzer in his study of older adults in South Africa found none of the identified socio-demographic variables in his study such as lifestyle factors, cognitive variables, social cohesion, and chronic conditions (high blood pressure, diabetes, obesity) to be associated with depression (Peltzer, 2012).

2.3 Theoretical Framework

This research builds upon the Collective Efficacy Theory by Sampson and colleagues (1997) in emphasising the role of social cohesion on the health of adults of South Africa.

The collective efficacy theory highlights the impact of neighbourhood structural factors in the form of social cohesion and informal social control on resident's quality of life and health status (Sampson, Morenoff, & Earls, 1999; Sampson *et al.*, 1997).

The theory is based upon the Social Disorganisation Theory of Criminology with roots in the Chicago school (Sampson *et al.*, 1997). It moves beyond a narrow focus on network ties to emphasise mutual trust and solidarity among residents (social cohesion) and, principally, expectations for action (informal social control) in explaining the impact of neighbourhood factors on residents' well-being and health status (Sampson *et al.*, 1999). It articulates that crime rates could be reduced as a result of strong mutual trust, shared expectations and the capacity to influence informal social controls all of which will only be evident through strong neighbourhood collective efficacy (Farmer, 2014). Focusing on crime rates in Chicago communities, Sampson and colleagues found that collective efficacy had a significant impact on perceptions of crime, self-reported victimisation, and homicide rates (Sampson *et al.*, 1997). It also argues that collective efficacy contributes to the ability of communities to regulate their members according to desired principles (Sampson *et al.*, 1997). Moreover, collective efficacy mediated the effects of poverty, residential instability, and ethnic heterogeneity on crime (Browning & Cagney, 2002).

Collective efficacy has since been applied to behaviours that take place mostly in public. For instance, research has shown the effects of collective efficacy within neighbourhoods in controlling misconducts and crime, regardless of the demographic composition of the population (Sampson *et al.*, 1997; Simons *et al.*, 2005). Its link with private behaviours like intimate homicide rates and nonlethal partner violence is also well documented (Browning & Cagney, 2002). Its effect in limiting risky sexual behaviours and delaying of sexual onset of adolescents has also been observed (Browning *et al.*, 2008; Browning, Leventhal, & Brooks-Gunn, 2005). The theory has also been used to examine community effect on self-rated health, asthma rates and adverse birth outcomes (Browning & Cagney, 2002; Cagney & Browning, 2004; Morenoff, 2003).

In line with this theory, this study hypothesises that the social cohesion dimension of collective efficacy may predict the health status of adults in South Africa. The mechanisms through which this may contribute to health include the social control of health-related behaviours, access to health care services and amenities, the management of neighbourhood physical hazards, and psychosocial processes all of which may generate a protective effect for health (Kawachi & Berkman, 2000).

2.4 Conceptual Framework

The conceptual framework for this study was guided by the reviewed literature as well as the collective efficacy theory. As pointed out earlier, the collective efficacy theory articulates the role of mutual trust and solidarity among local residents (social cohesion) and informal social control in explaining the impact of neighbourhood factors on residents' well-being and health.

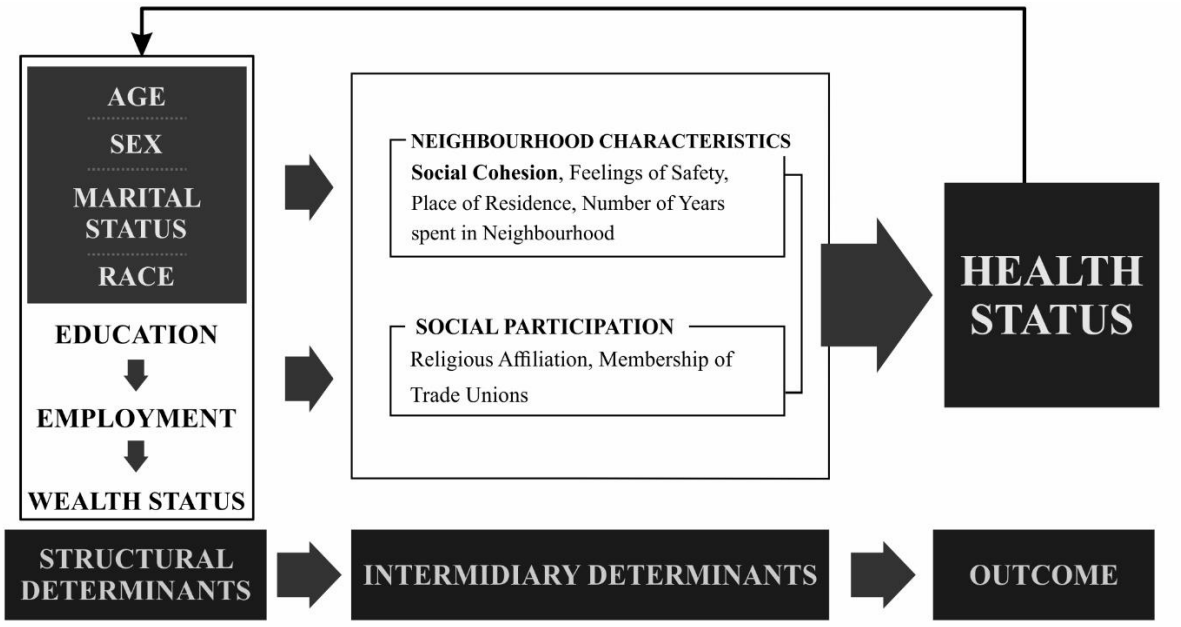


Figure 2.1: Conceptual Framework for the study of the relationship between social cohesion and health status among adults in South Africa *(adapted from the Collective Efficacy Theory, 1997)*

As presented in **figure 2.1** above, the structural determinants on the left side of the framework influence health status through the intermediary determinants. The arrows in the figure above show that structural determinants do not lead or influence health directly but do so through a set of factors such as social cohesion and other neighbourhood, characteristics and social participation. Health status can also impact on an individual's social or economic position for instance, by compromising education and limiting employment opportunities thereby reducing wealth status.

2.5 Hypothesis:

Based on the frameworks above, the following hypotheses were tested:

H_0: Social cohesion is not associated with the health status of adults in South Africa

H_1: Social cohesion is associated with the health status of adults in South Africa

Significance level: $\alpha=0.05$

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the description of the study area and the sources of data. Also presented in this chapter are details of data collection procedures, sampling design technique, sample size, variables definition, data analysis procedures as well as the study limitations.

3.2 Description of Study Area

South Africa has been selected as the study country for this research. The country is situated in the bottommost part of Africa. Its neighbouring countries are Botswana, Lesotho, Mozambique, Namibia, Swaziland, and Zimbabwe. The country is divided into nine (9) provinces which vary by size, from Northern Cape province which covers nearly 30% of the country's land area, to Gauteng province, which takes up a mere 1.5%. The 2011 national population Census estimated the country's population to be 51,770,560 while the current mid-year population of the country is estimated at 55,91 million (Statistics South Africa, 2016).



Figure 3.1: Map of South Africa showing the nine (9) provinces of the country.

South Africa has an interesting and politically turbulent past characterised by racial discrimination prior to and in 1994 when the country was declared as a democratic nation (De Wet, 2014). Since 1994, South Africa has enjoyed a peaceful and prosperous economic and political era (De Wet, 2014). At the same time, it has positioned itself as one of the economic hubs of Africa. However, despite the progress made and stability achieved, South Africa remains plagued by inequality with regards to education, employment and to an extent health services much like the rest of Africa (De Wet, 2014). For instance, a study found that school completion rate of White students is 173% higher than that of black African students (Sibanda & Lehloenya, 2005). Another study also found racial inequality in health such that more White South Africans were employed in the formal sector, compared to less than half of coloureds and black Africans in the same industry (Aliber, 2003).

Further, the burden of disease and mortality remains a challenge in South Africa. An estimated 7.03 million people in South Africa are reported to be living with HIV which is approximately 12.7% of the total South African population (Statistics South Africa, 2016). Today, more than five and a half million people in South Africa are living with HIV/AIDS more than exist in the whole of Asia (UNAIDS, 2013). South Africa is also doing poorly with regards to other development indicators. For instance, infant mortality rate is now estimated at 33.7 per 1,000 live births from about 37.9 deaths per 100,000 live births in 2011 (Statistics South Africa, 2016).

The enormous burden of disease and mortality faced by adults in the country makes South Africa a fascinating study area to examine the nexus between social cohesion and health status.

3.3 Data Source

This study used data from the 2012 South African Social Attitudes Survey (SASAS), questionnaire 3, version 3 implemented annually by the Human Sciences Research Council (HSRC). Beginning in 2003 up to 2012, the SASAS dataset has been a nationally representative sample of individuals aged 16 years and older in South Africa irrespective of their nationality or citizenship in households geographically spread across the nine provinces of the country (Roberts & Struwig, 2012). The dataset contains a standard 'core' set of demographic, behavioural and attitudinal variables, which is repeated each round, with the aim of monitoring change and continuity in a variety of social, economic and political values over time (Roberts & Struwig, 2012).

3.4 Sampling Design

The South African Social Attitudes Survey was designed to yield a representative sample of adults aged 16 and older. The sampling frame used for the survey is based on the set of the 80,787 enumerator areas (EAs) as were designed for the 2001 Population Census (Roberts & Struwig, 2012). Estimates of the population numbers for various categories of the census variables were obtained per EA. These estimates were annually updated to coincide with StatsSA's midyear estimates in respect of the variables province, gender, population group and age-group (Roberts & Struwig, 2012).

In all these created sampling frames special institutions (such as hospitals, military camps, old age homes, school and university hostels), recreational areas, industrial areas and vacant EAs were excluded prior to the drawing of the sample (Roberts & Struwig, 2012). In the sampling, enumerator areas (EAs) were used as primary sampling units (PSUs) and the estimated number of dwelling units (taken as a visiting point) in the EAs as secondary sampling units (Roberts & Struwig, 2012).

3.5 Sampling Procedure and Selection of Respondents

This survey used a multi-stage sampling technique. In the first sampling stage PSUs (EAs) were drawn with probability proportional to size, using the estimated number of dwelling units (DUs) in an EA (PSU) as a measure of size (MOS) (Roberts & Struwig, 2012). The DU as secondary sampling unit has been defined as separate (non-vacant) residential stands, addresses, structures, flats, homesteads, etc.

In the second sampling stage, a predetermined number of individual dwelling units (or visiting points) were drawn with equal probability in each of the drawn DUs.

Finally, in the third sampling stage, a person was drawn with equal probability from all 16 years and older individuals in the drawn DU (Roberts & Struwig, 2012). Three explicit stratification variables were used, namely province, geographic type and majority population group (Roberts & Struwig, 2012). In each of these drawn PSUs, two clusters of 7 dwelling units were drawn, thus resulting in two non-overlapping SASAS samples consisting of 7 DUs each (Roberts & Struwig, 2012).

For each of the SASAS samples interviewers visited each visiting point drawn in the EA (PSU) and listed all eligible persons for inclusion in the sample, that is, anyone currently aged 16 years or over and resident at the selected visiting point. A respondent using a random selection procedure based on a Kish grid (Roberts & Struwig, 2012).

3.6 Study Population and Sample

The population of interest for this study are adults aged 18 years or older in the nine provinces of South Africa and are usual residents in the selected households. The sample for this study was a weighted distribution of 30,765,974 (1,988 unweighted) adults who are 18 years or older at the time of the survey.

3.7 Study Variables

3.7.1 Outcome Variable

The outcome of interest in this study is health status of adults which was measured by individual's assessment of their health status rated on a 3-point Likert scale categorised into good (2), moderate (1) and poor (0). As a self-report of one's overall health status, individual assessment of their health status measures the extent to which individuals are satisfied with their health in general and their ability to perform their usual activities, not whether they had received an official diagnosis of general health. This measure of health status was used in this study because of its reliability as well as construct and criterion validity in predicting health status which is evident in psychometric and health status assessment literature (George, 2001; Patrick & Erickson, 1993). For instance, self-rated health has been shown to predict mortality, morbidity, disability and health care utilisation in earlier studies (Browning & Cagney, 2002; Ferraro, Farmer, & Wybraniec, 1997; Idler & Benyamini, 1997; Idler & Kasl, 1995; Malmström, Sundquist, & Johansson, 1999).

3.7.2 Main Predictor Variables:

The main predictor variable for this study is social cohesion which was assessed by five items measure of social cohesion drawn from the collective efficacy theory which encompasses trust, sense of belonging and shared values (Sampson *et al.*, 1997). Respondents were asked if people in their neighbourhood could be trusted, share similar values, willing to help each other. Response categories for this measure were rated on a 5-point Likert scale 1-5 with categories ranging from 1 implying 'strongly agree' up to 5 indicating 'strongly disagree'. Respondents were also asked if they can ask their neighbours for favours in cash and health related favours which were also operationalized

on a 1-4 Likert scale from 1 implying 'very comfortable' to 4 implying 'very uncomfortable'. These responses were reverse coded so that higher values indicated very comfortable or strongly agree and lower values indicated very uncomfortable or strongly disagree. The five items were subjected to principal component factor analysis with Promax rotation for respondents who gave responses to all the five items. Two factors with "eigenvalues" above one were identified by the principal component factor, but only factor 1 with "eigenvalue" of 3.25 was selected as a measure of social cohesion because it explained close to two-thirds (65%) of the variance. Factor scores were then generated for the first component and divided into tertiles to create a new categorical variable of low, medium and high social cohesion. Cronbach's alpha (α) for this scale was 0.83 depicting a strong internal reliability.

3.7.3 Control Variables:

In order to reduce the possibility that any significant effects were spurious, this study accounted for a number of control variables and potential confounders. These variables include age, sex, race, marital status, educational attainment, employment status, wealth status, province of residence, social class, citizenship, length of stay in the neighbourhood, and unsafety feelings within the neighbourhood.

Biological characteristics that were included in the models are age, sex and race. This variable was included in the regression models because of its effect in predicting health as evident in previous studies (Chen *et al.*, 2015; Inoue *et al.*, 2013). As evident in these studies, the effect of age on health may be attributed to the cumulative effect of health-compromising behaviours in younger ages which may only be evident in later years (Chen *et al.*, 2015). Both race and sex are also expected to influence health through the health-compromising conditions that associated with being male or female, African, white, Indian or coloured. Age in this study was operationalized as a continuous variable

ranging from 18 years to highest year (94 years) of the oldest adult in the study. Sex was also operationalized as male (0) or female (1). Race was operationalized to account for all the racial groups in South Africa with categories Black Africa (1), coloured (2), Indian or Asian (3) and white (4). Marital Status was assessed from the question that asked for adult's current marital status at the time of data collection. Those who reported being never married but engaged or not engaged were classified as never married (0), those who reported being traditionally and/or civilly married were classified as married (1), while separated or divorced adults were categorized as divorced/separated (2) and those who are widowed were classified as widowed (3).

Adult's level of education, employment status and household wealth are essential economic characteristics that were also controlled for in this study. Previous studies have shown that these structural factors are important characteristics that influence health or how health care services are accessed (Beaudoin, 2009; Mulvaney-Day *et al.*, 2007). These studies suggest that improvement in education, wealth and employment are likely to increase adults access to health care services or participate less in health-compromising behaviours as a result of the knowledge associated with their socioeconomic status (Cramm *et al.*, 2013; Mulvaney-Day *et al.*, 2007).

Respondents highest educational attainment was operationalized as no education (0), primary (1), secondary (2) and tertiary education (3). Employment status of respondents was also assessed from the question that asked what the current employment status of respondents are. Adults who reported being sick, pensioner, housewife or student were classified as inactive (0), those who reported being unemployed were classified as unemployed (1) while those who reported being employed full-time or part-time were categorised into employed (2). Adults that reported other employment statuses were categorised as others (3). Household wealth status was operationalized at the household

level from the question that asked if the total monthly household income is higher, lower or lesser than what is considered to be minimal for the household. Adults who reported that their monthly household income is much lower or lower were categorised as poor (0) those who reported more or less the same were categorised as average (1) and those who indicated that their household monthly income is higher or much higher were classified as higher (2).

Respondent's length of stay in the neighbourhood was assessed by subtracting the year in which respondents moved into the neighbourhood from the year the data was collected (2012). Responses to this item were rated as a continuous variable from 0 (implying less than a year). Feeling of unsafety within the neighbourhood was assessed from the question that asked how safe or unsafe respondents feel 'walking alone in their neighbourhood or area after dark'. These responses were afterwards rated on a 4-point Likert scale where (0) implied very unsafe, (1) indicated a bit unsafe, (2) fairly safe and (3) indicating very safe.

3.8 Data Management

Data for this study was managed and analysed using Stata software version 14. All missing values and don't knows were excluded from the analysis (Stata Corporation, USA).

3.9 Analysis Plan

To be able to address the research question in the study, each of the research objectives were addressed.

The First Objective which was to describe the health status of adults in South Africa was addressed by using a tabular presentation of frequency and percentage distributions

of adults by the self-assessment of their health status. Result for this objective was presented in a pie chart.

The Second Objective which was to assess and describe the health status of adult according to social cohesion, socio-economic and demographic characteristics was addressed by using cross-tabulations. For this objective, the health status variable was cross-tabulated with social cohesion and other selected socio-demographic characteristics. Chi-square test was used to detect significant differences in health status of adults and the selected characteristics. Results were presented with lower and upper bounds of the confidence intervals showing the range of the estimate with 95% probability. Bar charts were used to assess the health status of adults by social cohesion. Health status of adults and levels of social cohesion across South African provinces were also mapped using QGIS software. Health status across other selected socio-demographic and economic characteristics were presented in tables.

The Third Objective which was to describe the relationship between social cohesion and self-rated health status of adults was addressed by step-wisely fitting a cumulative logistic regression model while controlling for a number of covariates. The choice of this regression model was because the outcome variable has more than two categories with some form of natural ordering. Four different models with different combinations of social cohesion, socio-demographic characteristics, economic characteristics, social participation, and neighbourhood characteristics were produced to explore more succinctly, the associations. Descriptions of this models are presented below.

Model 1: considered only social cohesion and the outcome variable.

Model 2: considered model 1 and socio-demographic characteristics like age, sex, race and marital status.

Model 3: considered model 2 and economic characteristics like educational attainment, employment status, household wealth status, and social class.

Model 4: considered model 3 and membership of social group variables like membership of trade unions, and religious organisations.

Model 5: considered model 4 and neighbourhood characteristics like the number of years spent in the neighbourhood, feelings of safety, and place of residence.

The cumulative logistic regression equation for this association was modelled as follows:

$\ln(\frac{Health\ Status}{1-Health\ Status}) = \beta_0 - (\beta_{sm}\chi_{sm} + \beta_s\chi_s + \ldots\ldots + \beta_k\chi_k)$ ---------- equation i (Kleinbaum & Mitchel, 2010).

where β_{sm} is the regression coefficient for the main predictor variable (social cohesion);

and other βs are the regression coefficients for other predictor variables or controls

χ_{sm}= is the main predictor variable and other χs are control variables

β_0 = the intercept of the regression model.

Interpretations of results were made using odd ratios (OR) with OR>1 indicating a higher risk, OR<1 indicating a lower risk and OR=1 indicating no risk difference. The level of significance was set at 0.05, and a confidence interval (CI) of 95% was used. McKelvey and Zavoina's pseudo-R^2 was utilised in this study as against the conventional pseudo-R^2 because it has been found that it most closely approximates the R^2 obtained by fitting the linear regression model (LRM) on the underlying latent variable for ordinal outcomes (McKelvey & Zavoina, 1975; Windmeijer, 1995). Data and variables were weighted using "iweights" to correct for survey design sampling errors and to ensure that the sample reflects truly, the population from which it was drawn.

The Fourth Objective which was to examine the relationship between social cohesion and self-rated health status of adults across racial groups was also addressed by fitting a cumulative logistic regression model, stratified across the four (4) racial groups (black Africans, coloureds, Indian or Asian, and whites) in South Africa.

The regression equation for the models will, therefore, be as follows:

$$\ln\left(\frac{Health\ Status}{1-Health\ Status}\right)_r = \beta_{ojr} - (\beta_{r_sc}\chi_{r_sc} + \beta_{w2}\chi_{w2} + \ldots\ldots + \beta_{wk}\chi_{wk}) \text{ ------ equation ii (Kleinbaum \& Mitchel, 2010).}$$

$$\ln\left(\frac{Health\ Status}{1-Health\ Status}\right)_m = \beta_{ojm} - (\beta_{m_sc}\chi_{m_sc} + \beta_{b2}\chi_{b2} + \ldots\ldots + \beta_{bk}\chi_{bk}) \text{ ------- equation iii (Kleinbaum \& Mitchel, 2010).}$$

$$\ln\left(\frac{Health\ Status}{1-Health\ Status}\right)_p = \beta_{ojp} - (\beta_{p_sc}\chi_{p_sc} + \beta_{c2}\chi_{c2} + \ldots\ldots + \beta_{ck}\chi_{ck}) \text{ -------- equation iv (Kleinbaum \& Mitchel, 2010).}$$

where β_{sc} is the regression coefficient for the main predictor variable (social cohesion);

and other βs are the regression coefficients for other predictor variables or controls

χ_{sm}= is the main predictor variable and other χs are control variables

β_{oj}= the intercept of the regression model.

r, m, p= are the categories of wealth status (Rich, Moderate, and Poor).

3.10 Model Diagnostics

Test for specification error, parallel regression and multicollinearity were conducted to ensure that the model fits reasonably for the data.

3.10.1 Test for Parallel Regression Assumption

Under maximum likelihood theory, three types of tests (Wald tests, LR tests, and score tests) are used to check the parallel regression assumption using the *-oparallel-* command. A statistically significant test statistic on each of the tests provides evidence

of a parallel regression assumption. Wald test was used to estimates the unconstrained model and tests the restrictions in the null hypothesis. This was computed by fitting a generalised ordered logit model with gologit2 and then testing the constraints implied by parallel regressions with the test command. The result of the Wald test presented in **Appendix D** below was marginally significant (p=0.049) and as such an approximate Wald test, known as the Brant test, which compares the estimates from binary logit models was computed. The result of this test *(brant)* provides evidence that the parallel regression assumption has not been violated (p>0.05).

The LR test was also used to estimate both the unconstrained and the constrained models and examines the change of the log likelihood. The LR test is computed by fitting a generalised ordered logit model with gologit2 and the ordered logit model with *ologit* and comparing the log likelihoods. Similar to the -*brant*- test, the result of the LR test (p>0.05) confirms that the parallel regression assumption has not been violated.

The score test estimates the constrained model and (oversimplifying some) estimates how much the log likelihood would change if the constraints were relaxed. The result (p>0.05) of this test like others provides evidence that the parallel regression assumption has not been violated. The -*oparallel*- command does not check for violations of parallel regressions for individual variables, and as such, -brant- test was conducted with 'detail' option to test if individual variables in the regression model do not violate the *oparrallel* regression assumption. The result of this diagnostic presented in **Appendix B** showed that none of the predictor variables included in the model violates the parallel regression assumption.

3.10.2 Test for Specification Error

The test for specification error is used to examine whether the logit of the outcome variable is a linear combination of the independent variables and that only and all the relevant variables have been included in the model. The is often done using the Stata command -*linktest*- usually after the logit or logistic command. The *linktest* uses the linear predicted value *(_hat)* and linear predicted value squared *(_hatsq)* as the predictors to rebuild the model such that the variable _hat should be a statistically significant predictor since it is the predicted value from the model. On the other hand, the _hatsq *(linktest)* is not expected to have much predictive power (insignificant) except by chance if the model is correctly specified and relevant variable(s) has not been omitted. A contrary result, on the other hand, is an indication of a specification error such that the link function is not the correct choice or the relationship between the logit of the outcome variable and the independent variables are not linear.

From **Appendix C**, the _hat is statistically significant (p-value=0.000) while the *linktest* was not significant (p-value=0.552). This to an extent confirms that relevant predictor variables have been included in the model and the model has been correctly specified.

3.10.3 Test for Multicollinearity

The test for multicollinearity examines the level of collinearity among the study variables. This could be done using a correlation matrix, variance inflation factor (VIF) or test for tolerance. A very high correlation coefficient above (0.80) between study variables as well as a tolerance value above 0.1 and VIF value of 10 or more may be an indication of multicollinearity. The result of the correlation matrix presented in **Appendix F** showed that there was no evidence of multicollinearity among the study variables. Similarly, with a tolerance value of 0.78 (1-R2) which is greater than 0.1 and

a VIF value of 1.28 ($\frac{1}{\text{Tolerance}}$) which is very much less than 10 implies that the model fits perfectly and that the variables did not collinear with another.

3.11 Limitations of the study and data quality

One of the methodological challenges in studying perceived neighbourhood characteristics and health with data derived from surveys particularly those with cross-sectional design is that, the outcome (individual health status) and neighbourhood characteristics were measured in the same source (i.e. both are reported by the same person), leading to the possibility of same-source bias, which is likely to compromise the results (Echeverría *et al.*, 2008). As such, associations in the study may reflect bidirectional causality, where higher social cohesion may lead to more positive self-reported health, but healthier people may also tend to rate their neighbourhoods as more socially cohesiveness. Adults in poor health may also be negative about their areas, or individuals with a generally pessimistic world-view may be more likely to report both their health and their neighbourhoods as being less cohesive.

The second limitation was that all the characteristics in the study were self-reported, with possible implications for accuracy. Data on years spent in the neighbourhood was of particular concern because it was self-reported and the likelihood of a recall bias cannot be overlooked. When years spent in the neighbourhood was excluded from the models, the direction of the associations persisted which suggests that the results were not affected by this limitation.

Furthermore, there was a relatively high number of missing values and don't knows (19%) particularly for the measure of social cohesion (5%) compared to other variables.

Finally, the most important individual level characteristics were controlled for. It is possible that the relationship between social cohesion and health status coincided with

other unmeasured neighbourhood-level characteristics, such as neighbourhood-level cohesion among others, that instead were responsible for the health effects found. This should be a point of interest for future research on neighbourhood effects on health in sub-Sahara Africa although it appears that the healthful effects of social connection are primarily experienced through individual-level rather than community or neighbourhood level social connections, among Latinos (Mulvaney-Day *et al.*, 2007). Another study of adults in Chicago, US also showed that associations between social cohesion and depressive symptoms were stronger using individual-level measures than with neighbourhood level measures (Mair *et al.*, 2010).

On a positive note, findings from this study add the 'African perspective' to the ongoing debate on the healthful effect of social cohesion for adults, the majority of which has been concentrated in developed countries. In the context of this study, it is also noteworthy that because of its large sample size this study has the statistical power to detect small effects and the robust analysis provides a nuanced understanding of the relationship under study.

3.12 Ethical Considerations

Data for this study was from a secondary source and are completely anonymous in that all personal, confidential and identifying information or characteristics of the respondents has been meticulously cleaned to minimise any risk of harm that this may cause.

CHAPTER FOUR

RESULTS

Objectives of this study were to assess the health status of adults in South Africa, appraise the health status of adults by social cohesion and selected characteristics and to examine the relationship between social cohesion and health status of adult South Africans while controlling for socio-demographic, economic, and neighbourhood characteristics as well as social participation.

4.1 Descriptive Profile of Adults in South Africa

The mean age of adults in this study is about 37.6 years. More than half of the study population are females (54%) and the majority are black Africans (75%) while whites and coloureds each constitute about one-tenth of the population. The majority of the adults (57%) were also never married and close to one-tenth were formerly married. Almost three-quarter of the adults had attained the secondary level education while about 14% had less than secondary education. Only about one-third of the adults are currently employed while another 28% reported having never been employed. About 45% also reported that their family is rich while only 21% are residing in poor households. The average number of years spent in the neighbourhood among the adults is 17.7 years while almost two-thirds of the adults feels unsafe in the same neighbourhood. Only about one-third of the adults are residing in the rural place of residence, and about 85% are affiliated with a religious group. The majority of the adults also reported having never been a member of trade union groups while about one-tenth are current members. Summary details of how the study sample was drawn are presented in Appendix A.

Table 4.1: Descriptive profile of adults 18 years or older in South Africa, (SASAS, 2012)

Socio-Demographic Characteristics	Frequency Distribution	Percentage Distribution (%)
Social Cohesion		
Lowest Tertile	9,963,821	36.6
Middle Tertile	9,061,166	33.3
Highest Tertile	8,214,206	33.6
Age (in Years)		
Mean [Min - Max]	37.6 [18 - 94]	
Sex		
Male	12,453,737	45.7
Female	14,785,457	54.3
Race		
Black African	20,364,772	74.8
Coloured	2,814,653	10.3
Indian or Asian	948,982	3.5
White	3,110,787	11.4
Marital Status		
Never Married	15,577,254	57.2
Married	8,957,106	32.9
Divorced/Sperated	1,207,332	4.4
Widowed	1,497,502	5.5
Employment Status		
Currently Employed	9,299,035	34.1
Not Currently Employed	7,734,556	28.4
Never been Employed	10,205,603	37.5
Educational Attainment		
Primary or less	3,796,894	13.9
Secondary	20,643,621	75.8
Tertiary	2,798,679	10.3

Table 4.1 ***Cont.*****:** Descriptive profile of adults 18 years or older in South Africa, (SASAS, 2012)

Socio-Demographic Characteristics	Frequency Distribution	Percentage Distribution (%)
Household Wealth		
Rich	12,263,361	45.0
Average	9,375,813	34.4
Poor	5,600,019	20.6
Length of Stay in the Neighbourhood (Years)		
Min – Max (0 – 85)	**Mean=17.7**	**S.D=12.9**
Feelings of Safety		
Feels Safe	9,555,146	35.1
Feels Unsafe	17,684,048	64.9
Place of Residence		
Urban	18,405,396	67.6
Rural	8,833,798	32.4
Religious Affiliation		
Yes	23,146,099	85.0
No	4,093,095	15.0
Membership of Trade Unions		
Currently a Member	2,970,539	10.9
Previously a Member	1,683,381	6.2
Never been a Member	22,585,274	82.9

4.2 Health Status of Adults in South Africa

As presented in **Figure 4.1** below, more than half (54%) of adults in South Africa reported being in good health while only about 17% reported being in poor health.



Figure 4.1: Health Status of Adults South Africans (SASAS. 2012)

4.3 Health Status of Adults in South Africa by Social Cohesion

As shown in **Figure 4.2** below, the percentage of adults reporting poor health is quite lower for adults in the highest and moderate tertile social cohesion (15%) compared to those in the lowest tertile social cohesion (21%). On the contrary, the percentage of adults reporting good health is higher among adults in the highest tertile social cohesion (59%) compared to 53% among those in the lowest tertile.

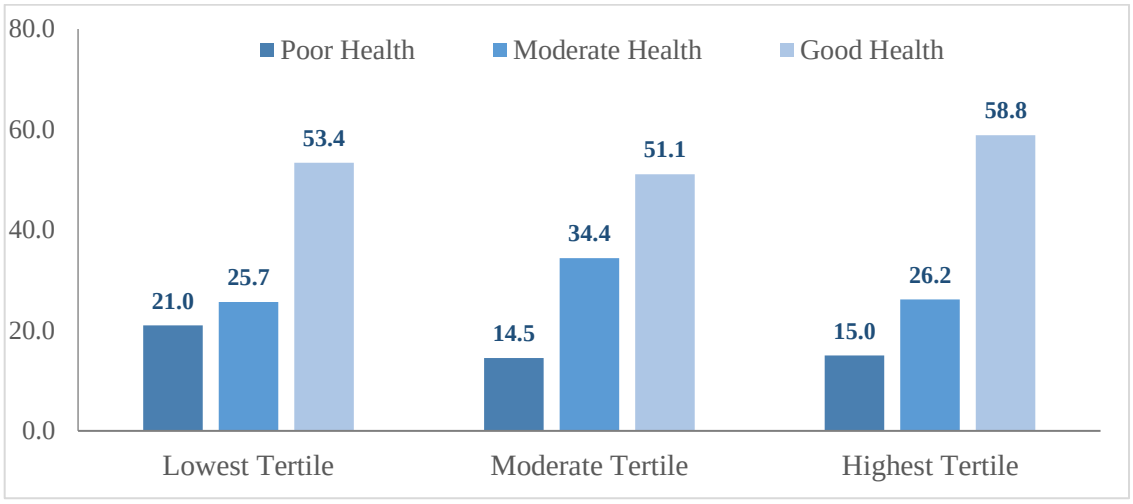


Figure 4.2: Health Status of Adults in South Africa by Social Cohesion (SASAS, 2012)

4.4 Health Status of Adults across South African provinces and selected characteristics

Across South African provinces as evident in **Figure 4.3**, results showed that more adults in the Western Cape (64%), Free State (58%), North West (61%) and Gauteng (62%) provinces of South Africa reported to be in good health while less than half of adults in the KwaZulu-Natal province (40%) reported to be in good health. When examined together with levels of social cohesion as presented in **Figure 4.4**, results showed that less than half (45%) of adults in North West province where health status is quite high are residing in moderate or highest tertile social cohesion. Similarly, close to 74% of adults in KwaZulu-Natal reported being in the highest tertile social cohesion although only about one-third are in good health.

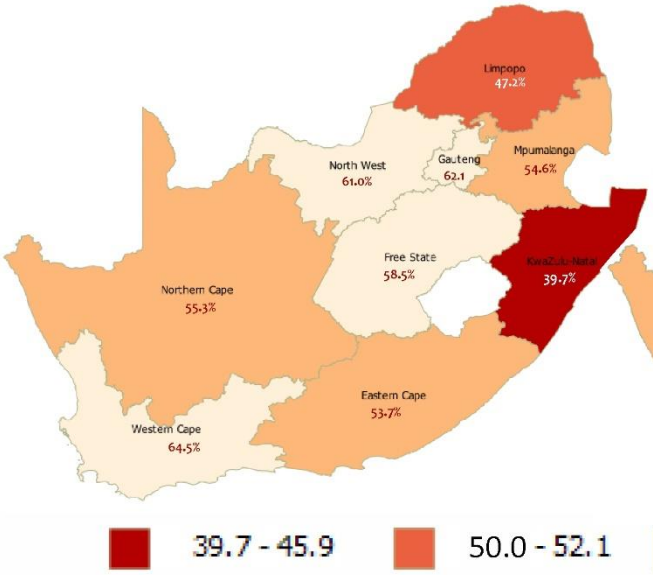


Figure 4.3: Percentage of adults in good health by provinces.

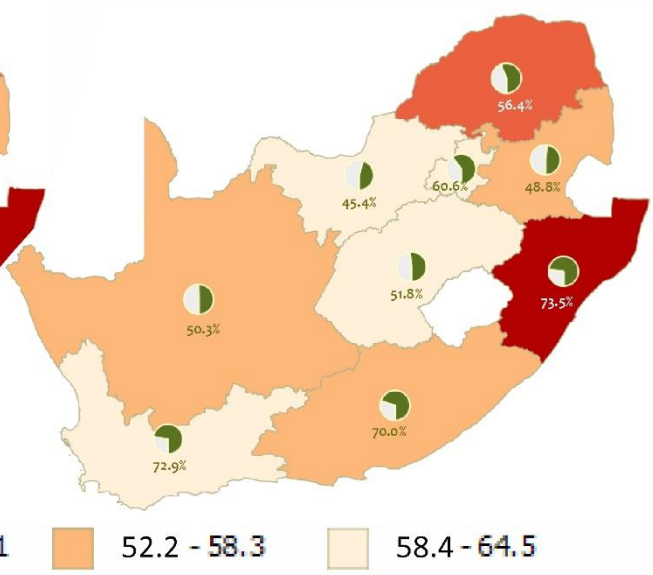


Figure 4.4: Percentage of adults in good health by social cohesion and provinces.

Results from **Figure 4.5** below showed that more than half of the adults residing in highest tertiles social cohesion reported to be in good health in majority of the provinces except in KwaZulu-Natal (49%) and Limpopo (40%) provinces where less than half of adults residing in highest tertile social cohesion reported to be in good health.

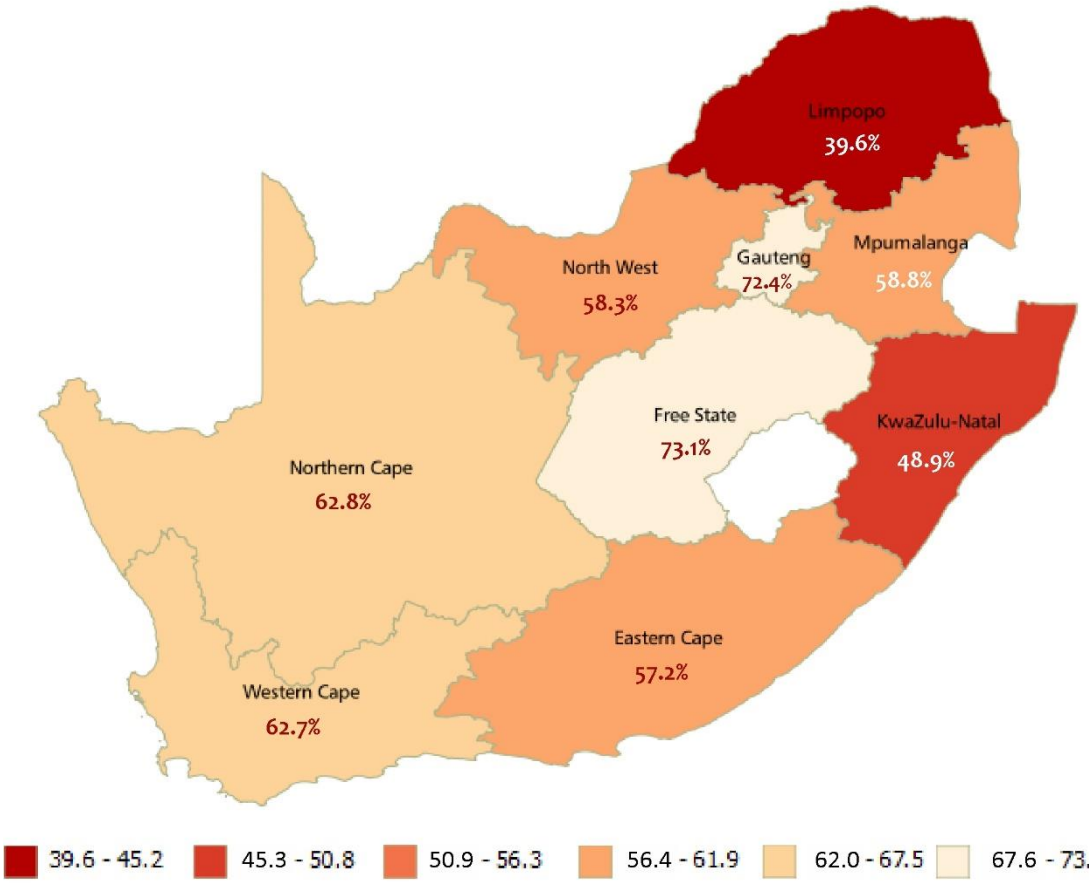


Figure 4.5: Percentage of Adults in good health and highest tertile social cohesion.

Examining the health status of adults across selected characteristics, results from **Table 4.2** below showed that the average age of adults in poor health is quite higher (45.3 years) than that of adults in good health (34.6 years) and the relationship is statistically significant ($p<0.05$). More males (56%) than females (53%) also reported to be in good health, but the relationship was not statistically significant ($p>0.05$). Across racial groups, about two-thirds of adults in the white racial group reported being in good health while slightly more than half of black Africans are in good health. More than half of never-married adults, currently married and divorced or separated adults reported to be in good health while slightly more than one-quarter of widowed adults reported being in good health and the relationship was statistically significant ($p<0.05$). More than half of adults with secondary education (57%) and those with higher education reported to be in good health while only about 38% of those with less than secondary education are in

good health and the relationship is also statistically significant ($p<0.05$). About 64% of currently employed adults and 52% of never been employed adults are in good health while less than half of those who are not currently employed reported to be in good health.

Only about 10% of adults in rich households reported to be in poor health while almost one-third of adults in poor households reported being in poor health and about 37% of adults in the same wealth status reported being in good health compared to 65% among those who are in rich households, and the relationship was statistically significant ($p<0.05$). Adults in good health (14.8 years) had a lower mean length of stay in the neighbourhood compared to adults in moderate health (16.7 years) or poor health (19.7 years). Almost 59% of adults who feel safe in their neighbourhoods reported to be in good health, and only 14% reported to be in poor health although the relationship was not statistically significant ($p>0.05$). More than half of adults residing in the urban place of residence reported being in good health while only 14% reported being in poor health. On the other hand, less than half of adults residing in rural residences are in good health, and about 23% are in poor health, but the relationship was also not statistically significant ($p>0.05$). Close to two-thirds of adults who are members of trade union groups reported to be in good health while less than half of adults who were once members of trade union groups (34%) reported being in good health and the relationship was also statistically significant ($p<0.05$).

Table 4.2.: Health Status of Adults (18+ Years) in South Africa by Socio-Economic and Demographic Characteristics, (SASAS, 2012)

Socio-Demographic Characteristics		Poor Health	Moderate Health	Good Health
		Percentages [CI]	Percentages [CI]	Percentages [CI]
Age (in Years)				
Mean	Pr > chi2 0.000	45.3 [9.290 - 9.351]	38.8 [22.66 - 2.74]	34.6 [67.93 - 68.03]
Sex				
Male	Pr > chi2 0.061	15.0 [14.98 - 15.02]	28.7 [28.71 – 28.76]	56.3 [56.24 – 56.29]
Female		18.7 [18.71 – 18.75]	28.7 [28.67 – 28.72]	52.6 [52.55 – 52.60]
Race				
Black African	Pr > chi2 0.005	18.8 [18.76 – 18.80]	30.3 [30.28 – 30.32]	50.9 [50.90 – 50.94]
Coloured		11.1 [11.03 - 11.10]	27.6 [27.52 – 27.63]	61.4 [61.30 – 61.42]
Indian or Asian		13.4 [13.37 – 13.50]	24.9 [24.84 – 25.02]	61.6 [61.53 – 61.73]
White		12.0 [11.98 - 12.06]	20.5 [20.45 – 20.54]	67.5 [67.43 – 67.53]
Marital Status				
Never Married	Pr > chi2 0.001	14.4 [14.43 – 14.47]	28.7 [28.66 – 28.71]	56.9 [56.84 – 56.89]
Married		17.2 [17.18 – 17.23]	28.2 [28.13 – 28.19]	54.6 [56.61 – 54.66]
Divorced/Separated		27.8 [27.70 – 27.86]	21.6 [21.51 – 21.66]	50.6 [55.74 – 50.73]
Widowed		34.1 [34.00 – 34.15]	38.0 [37.94 – 38.09]	27.9 [27.84 – 27.98]
Educational Attainment				
Primary or less	Pr > chi2 0.000	34.0 [33.91 – 34.00]	28.4 [28.38 – 28.47]	37.6 [37.57 – 37.67]
Secondary		14.6 [14.64 – 14.67]	28.3 [28.29 – 28.33]	57.0 [57.01 – 57.05]
Tertiary		11.5 [11.47 – 11.54]	32.1 [32.01 – 32.12]	56.4 [56.37 – 56.49]
Employment Status				
Currently Emmployed	Pr > chi2 0.000	9.9 [9.94 – 9.98]	26.1 [26.08 – 26.13]	63.9 [63.90 – 63.96]
Not Currently Employed		23.8 [23.80 – 23.86]	30.4 [30.38 – 30.44]	45.8 [45.72 – 45.79]
Never been Employed		18.3 [18.28 – 18.33]	29.8 [29.77 – 29.83]	51.9 [51.86 – 51.93]

Table 4.2 *Cont.*: Health Status of Adults (18+ Years) in South Africa by Socio-Economic and Demographic Characteristics, (SASAS, 2012)

Socio-Demographic Characteristics		Poor Health	Moderate Health	Good Health
		Percentages [CI]	Percentages [CI]	Percentages [CI]
Household Wealth				
Rich	Pr > chi2 0.000	10.1 [10.07 – 10.10]	24.5 [24.46 – 24.51]	65.4 [65.40 – 65.45]
Average		17.4 [15.24 – 17.40]	32.6 [32.59 – 32.65]	50.0 [49.97 – 50.03]
Poor		31.6 [24.96 – 31.67]	31.4 [31.38 – 31.46]	36.9 [36.91 – 36.99]
Number of Years spent in the Neighbourhood				
Mean	Pr > chi2 0.000	19.7	16.7	14.8
Feelings of Safety				
Feels Safe	Pr > chi2 0.229	14.5 [14.49 – 14.54]	26.7 [26.63 – 26.69]	58.8 [58.79 – 58.85]
Feels Unsafe		18.4 [18.36 – 18.40]	29.8 [29.80 – 29.84]	51.8 [51.77 – 51.82]
Place of Residence				
Urban	Pr > chi2 0.516	14.2 [149.19 – 14.22]	27.2 [27.18 – 27.22]	58.6 [58.57 – 58.62]
Rural		22.9 [22.86 – 22.92]	31.9 [31.84 – 31.90]	45.2 [45.20– 45.26]
Religious Affiliation				
Affiliated to a Religion	Pr > chi2 0.557	17.4 [17.42 – 17.45]	28.6 [28.64 – 28.68]	53.9 [53.88 – 53.92]
Not Affiliated		14.7 [14.66 – 14.73]	29.0 [28.97 – 29.06]	56.3 [56.24 – 56.33]
Membership of Trade Unoins				
Currently a Member	Pr > chi2 0.032	8.8 [8.73 – 8.79]	27.4 [27.32 – 27.42]	63.9 [63.82 – 63.92]
Previously a Member		35.1 [35.06 – 35.20]	30.4 [30.36 – 30.50]	34.4 [34.37 – 34.52]
Never been a Member		16.8 [16.75 – 16.78]	28.8 [28.74 – 28.78]	54.5 [54.45 – 54.50]

4.5 Relationship between Social Cohesion and Health Status of Adult in South Africans

Model 1 which included only the main predictor variable showed that adult in the lowest tertile social cohesion were about 24% [OR:0.76, CI:0.564 - 1.021] less likely to report

good health compared to adults in the highest tertile social cohesion but the relationship was not statistically significant.

Model 2 which considered the relationship between social cohesion while controlling for socio-demographic characteristics revealed that adults in the lowest tertile social cohesion [OR:0.71, CI:0.526 - 0.969] are significantly less likely to report good or moderate health compared to adults in the highest tertile social cohesion. A year increase in age also reduces the likelihood of reporting good or moderate health [OR:0.96 CI:0.947 - 0.964], and the relationship was statistically significant. Female adults are significantly less likely [OR:0.77, CI:0.610 - 0.983] to report good or moderate health compared to males. Adults in the white racial group [OR:1.70, CI:1.054 - 2.740] are almost two times more likely to report moderate or good health compared to adults in the coloured racial group. Black African [OR:0.55, CI:0.402 - 0.759] adults were, however, less likely to report good or moderate health compared to adults in Coloured racial groups, and the relationships were statistically significant. Having included socio-demographic characteristics in the model, this model explains almost 13% in the variability in the outcome variable.

Model 3 which considered the relationship between social cohesion while controlling for socio-demographic and economic characteristics showed that adults in the lowest tertile social cohesion [OR:0.69, CI:0.504 - 0.946] were significantly less likely to report moderate or good health compared to adults in the highest tertile social cohesion. Other significant predictors of health status in this model are educational attainment, wealth status, employment status and age. The statistically significant relationship between reporting moderate or good health and belonging to the white racial group disappeared after controlling for economic characteristics in this model, and all the predictor variables

in the model explain only about 20% variability in the outcome variable. The model is also statistically significant ($p<0.005$).

Model 4 considered the relationship between social cohesion and health while controlling for socio-demographic and economic characteristics as well as social participation variables like membership of trade union and religious affiliation. From Table 3, results showed that the relationship between social cohesion and health remained statistically significant and adults in the lowest tertile of social cohesion [OR:0.69, CI:0.504 - 0.946] were less likely to report moderate or good health compared to adults in the highest tertile of social cohesion. Other variables that were significantly associated with the health status of adults are age, wealth status, and membership of trade unions. Married adults [OR:1.38, CI:1.034 - 1.852] were significantly more likely to report moderate or good health compared to never married adults. In relation to wealth status, adults in rich households [OR: 1.86, CI:1.397 - 2.470]were more likely to report moderate or good health while those in poor households [OR: 0.54, CI:0.395 - 0.751] were less likely to report moderate or good health all compared to adults in average wealth households and the relationships were statistically significant. Overall, the model is statistically significant ($p<0.000$), and all the predictor variables explain about 21% variability in the model.

Model 5 which is the full model examined the relationship between social cohesion and self-rated health while controlling for socio-demographic characteristics, economic characteristics, social participation variables, and neighbourhood characteristics. Results from this model showed that adult in lowest tertile [OR:0.70, CI:0.516 - 0.965] and moderate tertile [OR:0.79, CI:0.589 - 1.055] social cohesion were less likely to report moderate or good health compared to adults in the highest tertile social cohesion but the relationship was only statistically significant among adults in the lowest tertile of social

cohesion. Other statistically significant predictors of health status in this model are age, marital status, educational attainment, employment status, wealth status, membership of trade unions, feelings of safety in the neighbourhood and place of residence. A year increase in age [OR:0.96, CI:0.946 - 0.966] also reduces the likelihood of reporting moderate or good health status. In relation to employment status, adults who have never been employed [OR:0.62, CI:0.446 - 0.851] are less likely to report moderate or good health compared to those who are currently employed, and the relationship was statistically significant while controlling for covariates in the model. Adults in rich households [OR:1.87, CI:1.406 - 2.476] were also more likely to report moderate or good health and those who are poor [OR:0.59, CI:0.429 - 0.824] were less likely to report moderate or good health compared to adults in average wealth households and the relationships were statistically significant. Adults who are members of trade union groups [OR:2.38, CI:1.356 - 4.177] and those who have never been a member [OR:2.12, CI:1.347 - 3.353] were about two-times more likely to be in moderate or good health compared to adults who are no more a member of trade union and the relationship was also statistically significant. In relation to neighbourhood characteristics, adults who feel unsafe [OR:0.77, CI:0.592 - 0.996] in their neighbourhood were less likely to be in moderate or good health compared to those who feel safe in their neighbourhood. Adults residing in the rural place of residence [OR0.68, CI:0.515 - 0.903] were also significantly less likely to be in moderate or good health compared to adults residing in an urban place of residence. Overall, the model is statistically significant ($p<0.000$) and all the variables in the model contribute about 22% to the variability in the health status of adults.

Table 4.3: Relationship between Social Cohesion and Health Status of Adults (18 Years or older) in South Africa. (SASAS, 2012)

	Model 1	Model 2	Model 3	Model 4	Model 5
Social Cohesion					
Lowest Tertile	0.76 [0.564 - 1.021]	0.71* [0.526 - 0.969]	0.69* [0.504 - 0.946]	0.69* [0.500 - 0.940]	0.70* [0.516 - 0.965]
Moderate Tertile	0.79 [0.606 - 1.039]	0.82 [0.612 - 1.085]	0.80 [0.599 - 1.076]	0.80 [0.596 - 1.072]	0.79 [0.589 - 1.055]
Highest Tertile	Ref	Ref	Ref	Ref	Ref
Age (in Years)		0.96* [0.947 - 0.964]	0.96* [0.945 - 0.964]	0.96* [0.947 - 0.965]	0.96* [0.946 - 0.966]
Sex					
Male		Ref	Ref	Ref	Ref
Female		0.77* [0.610 - 0.983]	0.84 [0.655 - 1.068]	0.84 [0.657 - 1.079]	0.86 [0.672 - 1.103]
Race					
Black African		0.55* [0.402 - 0.759]	0.66* [0.466 - 0.921]	0.61* [0.433 - 0.866]	0.70 [0.489 - 1.000]
Coloured		Ref	Ref	Ref	Ref
Indian or Asian		0.90 [0.516 - 1.562]	0.81 [0.459 - 1.437]	0.78 [0.439 - 1.385]	0.82 [0.461 - 1.470]
White		1.70* [1.054 - 2.740]	1.50 [0.905 - 2.484]	1.43 [0.850 - 2.403]	1.44 [0.847 - 2.452]
Marital Status					
Never Married		Ref	Ref	Ref	Ref
Married		1.55* [1.164 - 2.056]	1.36* [1.014 - 1.812]	1.38* [1.034 - 1.852]	1.34* [1.002 - 1.805]
Sep/Divorced		1.24 [0.719 - 2.156]	1.16 [0.627 - 2.092]	1.22 [0.664 - 2.236]	1.20 [0.644 - 2.229]
Widowed		1.00 [0.659 - 1.527]	0.90 [0.578 - 1.419]	0.91 [0.589 - 1.416]	0.90 [0.576 - 1.390]

Table 4.3: Relationship between Social Cohesion and Health Status of Adults (18 Years or older) in South Africa. (SASAS, 2012)

	Model 1	Model 2	Model 3	Model 4	Model 5
Educational Attainment					
< Secondary Edu			1.57 [0.944 - 2.621]	1.55 [0.922 - 2.591]	1.63 [0.964 - 2.754]
Secondary Edu			1.63* [1.078 - 2.465]	1.62* [1.067 - 2.458]	1.66* [1.088 - 2.535]
Tertiary Education			Ref	Ref	Ref
Employment Status					
Currently Employed			Ref	Ref	Ref
Currently not Employed			0.70* [0.514 - 0.956]	0.77 [0.553 - 1.075]	0.79 [0.563 - 1.101]
Never been Employed			0.59* [0.438 - 0.804]	0.60* [0.437 - 0.830]	0.62* [0.446 - 0.851]
Wealth Status					
Rich			1.87* [1.409 - 2.480]	1.86* [1.397 - 2.470]	1.87* [1.406 - 2.476]
Average			Ref	Ref	Ref
Poor			0.55* [0.400 - 0.757]	0.54* [0.395 - 0.751]	0.59* [0.429 - 0.824]
Affiliated to any Religious Group					
Yes				Ref	Ref
No				1.15 [0.815 - 1.611]	1.12 [0.796 - 1.568]
Membership of Trade Unions					
Currently a Member				2.42* [1.387 - 4.213]	2.38* [1.356 - 4.177]
Not Currently a Member				Ref	Ref
Never been a Member				2.14* [1.369 - 3.357]	2.12* [1.347 - 3.353]

Table 4.3: Relationship between Social Cohesion and Health Status of Adults (18 Years or older) in South Africa. (SASAS, 2012)

	Model 1	Model 2	Model 3	Model 4	Model 5
Feelings of Safety in the Neighbourhood					
Safe					Ref
Unsafe					0.77* [0.592 - 0.996]
Place of Residence					
Urban					Ref
Rural					0.68* [0.515 - 0.903]
Years spent in Neighbourhood					1.00 [0.988 - 1.006]
/Cut 1	**-1.76 [-1.993, -1.538]**	**-4.01 [-4.551, -3.464]**	**-3.74 [-4.436, -3.053]**	**-2.98 [-3.777, -2.192]**	**-3.18 [-3.985, -2.383]**
/Cut 2	**-0.35 [-0.558, -0.140]**	**-2.45 [-2.971, -1.935]**	**-2.11 [-2.787, -1.426]**	**-1.33 [-2.122, -0.548]**	**-1.52 [-2.316, -0.728]**
McKelvey & Zavoina R^2	**0.004**	**0.128**	**0.199**	**0.207**	**0.218**
Log pseudolikelihood	**-26955975**	**-25408561**	**-24503923**	**-24382384**	**-24249690**
Prob > chi2	**0.1331**	**0.0000**	**0.0000**	**0.0000**	**0.0000**
Sample Size	**27,239,194**	**27,239,194**	**27,239,194**	**27,239,194**	**27,239,194**

Model [1] controlled for only Social Cohesion

Model [2] controlled for Model 1 and Socio-Demographic Charateristics like Age, Sex, Race and Marital Status

Model [3] controlled for Model 2, and Economic Characterisitcs like Educational attainment, Employment Status, Household Wealth Status, and Social Class

Model [4] controlled for Model 3 and Social Participation variables like Membership of Social Groups, and Religious Affiliation

Model [5] controlled for Model 4 and Neighbourhood Characterisitcs like Number of Years spent in the Nieghbourhood, Feelings of Safety, and Place of Residence.

4.6 Relationship between Social Cohesion and Health Status of Adult South Africans across Racial Groups

Results from **Table 4.4** below showed the relationship between social cohesion and health status of adults across the four (4) racial groups in the country. Across all the racial groups excluding Indian or Asian adults, black African [OR:0.68, CI:0.472-0.989], coloured [OR:0.63, CI:0.305-1.309] and white [OR:0.67, CI:0.293-1.545] adults residing in the lowest tertile of social cohesion were less likely to be in moderate or good health compared to those in the highest tertile of social cohesion but the relationship was only statistically significant among black Africans. Similarly, black African [OR:0.78 CI:0.554-1.112], coloured [OR:0.60, CI:0.299-1.208] and white [OR:0.65, CI:0.287-1.473] adults residing in the moderate tertile social cohesion were less likely to be in moderate or good health compared to adults in the highest tertile social cohesion. Among Indian or Asian adults, however, those in the lowest tertile social cohesion [OR:1.44, 0.349-5.912] were more likely to be in moderate or good health while those in moderate tertile social cohesion [OR:3.72. CI:1.220-11.33] were almost four-times more likely to be in moderate or good health all compared to adults in the highest tertile social cohesion. Other significant predictors of health among black Africans are age, educational attainment, employment status, wealth status, membership of trade unions and place of residence. Among coloured adults, age, marital status, and wealth status were significantly associated with being in moderate or good health while only educational attainment, employment status, and wealth status were significantly related to reporting moderate or good health among Indian or Asian adults.

Table 4.4: Relationship between Social Cohesion and Health Status of Adults (18+ Years) across racial groups in South Africa (SASAS, 2012)

Socio-Demographic Characteristics	Black	Coloured	Indian or Asian	White
Self-Rated Health				
Lowest Tertile	0.68* [0.472 - 0.989]	0.63 [0.305 - 1.309]	1.44 [0.349 - 5.912]	0.67 [0.293 - 1.545]
Moderate Tertile	0.78 [0.554 - 1.112]	0.60 [0.299 - 1.208]	3.72* [1.220 - 11.33]	0.65 [0.287 - 1.473]
Highest Tertile	Ref	Ref	Ref	Ref
Age (Years)	0.95* [0.940 - 0.966]	0.96* [0.933 - 0.981]	0.95 [0.904 - 1.000]	0.98 [0.946 - 1.011]
Sex				
Male	Ref	Ref	Ref	Ref
Female	0.85 [0.633 - 1.135]	1.00 [0.555 - 1.816]	0.57 [0.216 - 1.508]	1.34 [0.589 - 3.041]
Marital Status				
Never Married	Ref	Ref	Ref	
Married	1.41 [0.998 - 2.000]	1.89 [0.905 - 3.931]	0.46 [0.128 - 1.633]	0.57 [0.175 - 1.884]
Sep/Divorced	0.98 [0.445 - 2.181]	3.65* [1.208 - 11.05]	0.32 [0.0485 - 2.055]	0.69 [0.104 - 4.543]
Widowed	0.82 [0.484 - 1.400]	1.29 [0.445 - 3.757]	0.82 [0.0945 - 7.037]	0.52 [0.107 - 2.549]
Highest Educational Attainment				
Secondary or lower	1.95* [1.053 - 3.609]	1.51 [0.609 - 3.737]	4.88* [1.455 - 16.38]	1.17 [0.529 - 2.590]
Higher Education	Ref	Ref	Ref	Ref
Employment Status				
Currently Employed	Ref	Ref	Ref	Ref
Currently not Employed	0.91 [0.593 - 1.393]	0.81 [0.392 - 1.680]	0.24* [0.0812 - 0.715]	0.47 [0.146 - 1.490]
Never been Employed	0.61* [0.421 - 0.896]	1.48 [0.587 - 3.707]	0.23 [0.0489 - 1.098]	0.69 [0.180 - 2.665]

Table 4 *Cont.*: Relationship between Social Cohesion and Health Status of South African Adults by Race (SASAS, 2012)

	Black	Coloured	Indian or Asian	White
Wealth Status				
Rich	1.93* [1.371 - 2.712]	1.40 [0.698 - 2.822]	6.16* [2.152 - 17.62]	1.88 [0.834 - 4.237]
Average	Ref	Ref	Ref	Ref
Poor	0.61* [0.427 - 0.874]	0.37* [0.161 - 0.860]	0.09* [0.0162 - 0.489]	1.05 [0.0315 - 34.76]
Affiliated to any Religious Group				
Yes	Ref	Ref	Ref	Ref
No	1.16 [0.795 - 1.692]	0.82 [0.254 - 2.651]	0.670 [0.0931 - 4.823]	0.57 [0.255 - 1.263]
Membership of Trade Unions				
Currently a Member	3.40* [1.607 - 7.191]	2.64 [0.866 - 8.045]	1.90 [0.423 - 8.521]	0.98 [0.227 - 4.269]
Not Currently a Member	Ref	Ref	Ref	Ref
Never been a Member	2.52* [1.365 - 4.635]	2.16 [0.926 - 5.020]	3.296 [0.761 - 14.28]	1.53 [0.494 - 4.732]
Feelings of Safety in the Neighbourhood				
Safe	Ref	Ref	Ref	Ref
Unsafe	0.79 [0.577 - 1.076]	0.41* [0.209 - 0.796]	1.02 [0.382 - 2.721]	0.87 [0.378 - 2.016]
Place of Residence				
Urban	Ref	Ref	-	Ref
Rural	0.62* [0.455 - 0.835]	0.98 [0.302 - 3.154]	-	5.64* [1.350 - 23.59]
Years spent in Neighbourhood	1.00 [0.987 - 1.009]	1.00 [0.978 - 1.027]	0.98 [0.934 - 1.018]	1.00 [0.974 - 1.034]
Observations	20,364,772	2,814,653	948,982	3,110,787

4.7 Testing of Hypothesis

The hypotheses for this study was tested using the full model for the multilevel analysis:

H_0: There is no statistically significant association between social cohesion and health of adults in South Africa

H_1: There is a statistically significant association between social cohesion and health of adults in South Africa

Assumption: Significance level: $\alpha = 0.05$

Given that the p-value was less than 0.05, this study failed to accept the null hypothesis and concludes that there is a significant association between social cohesion and health status of adults in South Africa.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Introduction

This study has addressed the four specific objectives. First, it examined the health status of adults in South Africa. Second, it assessed the health status of adults in South Africa by social cohesion, socio-economic and demographic characteristic. Third, it explored the relationship between social cohesion and self-rated health status of adults in South Africa, and finally, attention is brought to the relationship between social cohesion and self-rated health status of adults in South Africa across South African racial groups. The purpose of this chapter is therefore to present the findings of this study. In presenting this discussion, the various findings from this study are unified and integrated within the context of what is know about the topic globally.

5.2 Discussion of Study Findings

Findings from this study showed that majority of adults in South Africa are in good health and only about one-fifth are in poor health. Examining this pattern across South African provinces, only in KwaZulu-Natal province are fewer people reporting good health status. However, when explored together with levels of social cohesion, the majority of adults in the same KwaZulu-Natal province reported being in moderate or highest tertile social cohesion. More than half of adults in the highest tertile social cohesion are also in good health except in Limpopo and KwaZulu-Natal provinces of the country. There are several explanations for these findings. The lower percentage of adults reporting good health in KwaZulu-Natal province is likely to be as a result of the enormous burden of HIV/AIDs and its comorbidities in the province. For instance, the prevalence of HIV among 15-49 year olds in KwaZulu-Natal province was close to 40% between 2009 and 2010 (SANAC, 2011). At 37%, KwaZulu-Natal has the highest rate of HIV/AIDS infections in the country and about 25% of the province's adult population were also reported to be living with HIV in 2014, compared to a national average of 17.9% (Shisana *et al.*, 2014).

Examining the relationship between social cohesion and self-rated health status of adults in South Africa, this study hypothesised that adults in highest tertile social cohesion would be more likely to report moderate or good health compared to adults in the lowest tertile social cohesion. This assumption is based on both the theoretical and analytical frameworks such that higher social cohesion could contribute to the social control of health-related behaviours and the elimination of inequalities in access to health care services. It may also contribute to the management of neighbourhood physical hazards, and psychosocial processes all of which may generate a protective effect for health and reduce venerability to health-compromising conditions (Kawachi & Berkman, 2000). Findings from this study were consistent with the hypothesis as residing in the lowest tertile of social cohesion was significantly associated with a lower likelihood of reporting moderate or good health. This finding is also consistent with other previous studies in Japan, Netherlands, United States and West Scotland where high levels of social cohesion at both individual and neighbourhood level has been observed to predict good self-rated health (Fujisawa *et al.*, 2009; Macintyre & Ellaway, 2000; Moorman *et al.*, 2016; Putrik *et al.*, 2015; Rios *et al.*, 2011; Ruijsbroek *et al.*, 2016). One possible reason for this has been explained by the theoretical framework in terms of the social control of health-related behaviours in a socially cohesive environment (Sampson *et al.*, 1999; Sampson *et al.*, 1997). High levels of neighbourhood social cohesion based on friendships, visiting and borrowing and exchange of favours with neighbours may also facilitate access to networks and services that may help improve health (Fone *et al.*, 2014; Kawachi & Berkman, 2000). It may also foster healthy lifestyle behaviours such as safe public spaces for activity, clean and safe housing, and availability of nutritional foods all which may generate a protective effect for health and reduce venerability to health-compromising conditions (Rios *et al.*, 2011). High levels of social cohesion between residents may foster a sense of community and communication—which can keep residents knowledgeable about their community— improve the local services and resources that are available, and increase a personal sense of control, which in turn, can alleviate depressive symptoms (Stafford *et al.*, 2011). Since high social cohesion reflect communities that are

supportive of overall well-being characterised by trust, lower crime rates, more civic participation, and better access to health care among others, social cohesion within a neighbourhood may help residents exert social control (Berkman & Kawachi, 2000; Chambers *et al.*, 2015). It also can provide more support between neighbours, reduce the number of stressors that residents perceive to exist within the neighbourhood, and buffer or mitigate the stressors which do occur (Ahern & Galea, 2011; Rios *et al.*, 2011).

Another interesting finding of this study was observed when the relationship between social cohesion was explored across South African racial groups. It appeared that the healthful effect of social cohesion was only significant among adults in the black African racial group. It is possible that neighbourhood characteristics at the individual level are important for the health of adults in the black African racial group while neighbourhood level may help explain this relationship better of adults in other racial groups.

Other significant predictors of health status as evident in this study are age, wealth status, place of residence and feelings of safety. Research findings reveal that the likelihood of reporting moderate or good health reduces with age implying that younger adults may be more likely to report good health while older adults may be less likely. This finding is also consistent with another previous study of adults where a year increase in age was significantly linked with increases in mortality risk (Inoue *et al.*, 2013). The finding is also consistent with a more recent study that found age to be significantly related to subjective sense of health among older adults in Southern Taiwan (Chen *et al.*, 2015). This differences in health may be attributed to the cumulative effect of health comprising behaviours in younger ages which may be evident only in later years.

Previous studies have also documented that higher income and higher education were significant predictors of self-rated physical health and other health indicators like lower body mass index (Beaudoin, 2009; Cramm *et al.*, 2013; Mulvaney-Day *et al.*, 2007).

With regards to feelings of safety, this study provides a clear indication that adults tend to be healthier in safe neighbourhoods. This finding is also consistent with those previously obtained

in studies from Sweden and different sub-populations in the USA and the Netherlands (Putrik *et al.*, 2015; Ross & Mirowsky, 2001; Sundquist *et al.*, 2006; Wilson-Genderson & Pruchno, 2013). Another study in the Dutch city, however, found a different result which might be due to the heterogeneity in the measure of safety (Agyemang *et al.*, 2007; Cummins *et al.*, 2005).

Place of residence also emerged as a potentially relevant factor that ould affect the health status of adults in South Africa. This finding is also consistent with another study of adults residing in a Dutch municipality (Putrik *et al.*, 2015). The mechanism through which this can affect health may be indirect via access to health and social services (Putrik *et al.*, 2015).

Interestingly, it emerged that membership of trade union has a protective effect on the health of adults and a disconnection from this network has negative implications for the health of adults. This finding is consistent with a previous study of adults in South Africa where lower participation in social activities was negatively associated with general (Peltzer & Phaswana-Mafuya, 2013).

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

This study examined the health status of adults in South Africa, its patterns across selected characteristics were also explored. Attention was also brought to the relationship between social cohesion and health while also exploring the same across racial groups.

The study found that majority of adults in South Africa are in good health and a lower percentage of adults in the highest tertile of social cohesion reported being in poor health.

This study also demonstrated that residing in the lowest tertile of social cohesion was significantly associated with a lower likelihood of reporting moderate or good health particularly among the black majority of the South Africa. These results show that social cohesion among adults in South Africa particularly those in the black African racial group is necessary for improvement in health. It is, therefore, important for the government of South Africa through its agencies and departments intensify efforts in terms of the country's medium-term strategic framework (2014-19) as well as the national development plan, both of which are aimed at increasing social cohesion among adults in the country. This could be achieved through public awareness on the health importance of social cohesion and the need for neighbours to share similar values, trust one another and be willing to help. This is especially important if significant progress is to be made in achieving the sustainable development goals such that the health of adults in the country particularly the black Africans would have improved by 2030.

Given that the study is limited in its ability to establish causality between social cohesion and health status, future studies may need to explore this relationship using longitudinal data collected over an extended period of time in order to detect significant differences.

Future studies may also examine whether the protective benefits of social cohesion extend to other health indicators such as body mass index, health behaviours, and others within the context of South Africa and the broader sub-Saharan Africa. Awareness of this relationship may be critical for policy intervention towards reducing the incidence and prevalence of such diseases.

REFERENCES

Abdul-Sattar, A. B., & Abou El Magd, S. (2014). Association of perceived neighborhood characteristics, socioeconomic status and rural residency with health outcomes in Egyptian patients with systemic lupus erythematosus: one center study. *International Journal of Rheumatic Diseases*, n/a-n/a. doi:10.1111/1756-185X.12331

Agyemang, C., Hooijdonk, C. v., Wendel-Vos, W., *et al.* (2007). The association of neighbourhood psychosocial stressors and self-rated health in Amsterdam, The Netherlands. *Journal of Epidemiology & Community Health, 61*(12), 1042-1049. doi:10.1136/jech.2006.052548

Ahern, J., & Galea, S. (2011). Collective Efficacy and Major Depression in Urban Neighborhoods. *American Journal of Epidemiology, 173*(12), 1453-1462. doi:10.1093/aje/kwr030

Aliber, M. (2003). Chronic Poverty in South Africa: Incidence, Causes and Policies. *World Development, 31*(3), 473-490. doi:10.1016/S0305-750X(02)00219-X

Beaudoin, C. E. (2009). Bonding and bridging neighborliness: An individual-level study in the context of health. *Social Science & Medicine, 68*(12), 2129-2136. doi:10.1016/j.socscimed.2009.04.015

Benatar, S. (2013). The challenges of health disparities in South Africa. *SAMJ: South African Medical Journal, 103*(3), 154-155.

Berkman, L. F., & Kawachi, I. (2000). *Social Epidemiology*: Oxford University Press.

Browning, C. R., Burrington, L. A., Leventhal, T., *et al.* (2008). Neighborhood Structural Inequality, Collective Efficacy, and Sexual Risk Behavior among Urban Youth. *Journal of Health and Social Behavior, 49*(3), 269-285. doi:10.1177/002214650804900303

Browning, C. R., & Cagney, K. A. (2002). Neighborhood Structural Disadvantage, Collective Efficacy, and Self-Rated Physical Health in an Urban Setting. *Journal of Health and Social Behavior, 43*(4), 383-399. doi:10.2307/3090233

Browning, C. R., Leventhal, T., & Brooks-Gunn, J. (2005). Sexual Initiation in Early Adolescence: The Nexus of Parental and Community Control. *American Sociological Review, 70*(5), 758-778. doi:10.1177/000312240507000502

Cagney, K. A., & Browning, C. R. (2004). Exploring Neighborhood-level Variation in Asthma and other Respiratory Diseases. *Journal of General Internal Medicine, 19*(3), 229-236. doi:10.1111/j.1525-1497.2004.30359.x

Chambers, E. C., Fuster, D., Suglia, S. F., *et al.* (2015). Depressive Symptomology and Hostile Affect among Latinos Using Housing Rental Assistance: the AHOME Study. *Journal of Urban Health : Bulletin of the New York Academy of Medicine, 92*(4), 611-621. doi:10.1007/s11524-015-9965-0

Chen, W., Okumiya, K., Wada, T., *et al.* (2015). Social cohesion and health in old age: a study in southern Taiwan. *International Psychogeriatrics, 27*(11), 1903-1911. doi:10.1017/S1041610214002907

Churchyard, G. J., Fielding, K. L., Lewis, J. J., *et al.* (2014). A Trial of Mass Isoniazid Preventive Therapy for Tuberculosis Control. *New England Journal of Medicine, 370*(4), 301-310. doi:10.1056/NEJMoa1214289

Coovadia, H., Jewkes, R., Barron, P., *et al.* (2009). The health and health system of South Africa: historical roots of current public health challenges. *The Lancet, 374*(9692), 817-834. doi:10.1016/S0140-6736(09)60951-X

Cramm, J. M., Dijk, H. M. v., & Nieboer, A. P. (2013). The Importance of Neighborhood Social Cohesion and Social Capital for the Well Being of Older Adults in the Community. *The Gerontologist, 53*(1), 142-152. doi:10.1093/geront/gns052

Cummins, S., Stafford, M., Macintyre, S., *et al.* (2005). Neighbourhood environment and its association with self rated health: evidence from Scotland and England. *Journal of Epidemiology & Community Health, 59*(3), 207-213. doi:10.1136/jech.2003.016147

DeWet, N. (2014). Levels, causes and determinants of adolescent mortality in South Africa, 2001-2007 *(Doctoral Dissertation).* Retrieved from Wits Institutional Repository environment on DSpace. (Identifier uri: http://hdl.handle.net10539/13426)

Earnshaw, V. A., Lang, S. M., Lippitt, M., *et al.* (2015). HIV Stigma and Physical Health Symptoms: Do Social Support, Adaptive Coping, and/or Identity Centrality Act as Resilience Resources? *AIDS and Behavior, 19*(1), 41-49. doi:10.1007/s10461-014-0758-3

Echeverría, S., Diez-Roux, A. V., Shea, S., *et al.* (2008). Associations of neighborhood problems and neighborhood social cohesion with mental health and health behaviors: The Multi-Ethnic Study of Atherosclerosis. *Health & Place, 14*(4), 853-865. doi:10.1016/j.healthplace.2008.01.004

Ellaway, A., Macintyre, S., & Kearns, A. (2001). Perceptions of Place and Health in Socially Contrasting Neighbourhoods. *Urban Studies, 38*(12), 2299-2316. doi:10.1080/00420980120087171

Erdem, Ö., Lenthe, F. J. V., Prins, R. G., *et al.* (2016). Socioeconomic Inequalities in Psychological Distress among Urban Adults: The Moderating Role of Neighborhood Social Cohesion. *PLOS ONE, 11*(6), e0157119. doi:10.1371/journal.pone.0157119

Erdem, Ö., Prins, R. G., Voorham, T. A. J. J., *et al.* (2015). Structural neighbourhood conditions, social cohesion and psychological distress in the Netherlands. *The European Journal of Public Health, 25*(6), 995-1001. doi:10.1093/eurpub/ckv120

Farmer, A. K. (2014). Collective Efficacy Theory *The Encyclopedia of Theoretical Criminology*: John Wiley & Sons, Ltd.

Ferraro, K. F., Farmer, M. M., & Wybraniec, J. A. (1997). Health Trajectories: Long-Term Dynamics Among Black and White Adults. *Journal of Health and Social Behavior, 38*(1), 38-54. doi:10.2307/2955360

Flórez, K. R., Ghosh-Dastidar, M., Beckman, R., *et al.* (2016). The Power of Place: Social Network Characteristics, Perceived Neighborhood Features, and Psychological Distress Among African Americans in the Historic Hill District in Pittsburgh, Pennsylvania. *American Journal of Community Psychology, 58*(1-2), 60-68. doi:10.1002/ajcp.12086

Fone, D., White, J., Farewell, D., *et al.* (2014). Effect of neighbourhood deprivation and social cohesion on mental health inequality: a multilevel population-based longitudinal study. *Psychological medicine, 44*(11), 2449-2460.

Fujisawa, Y., Hamano, T., & Takegawa, S. (2009). Social capital and perceived health in Japan: An ecological and multilevel analysis. *Social Science & Medicine, 69*(4), 500-505. doi:10.1016/j.socscimed.2009.05.046

Gandhi, N. R., Moll, A., Sturm, A. W., *et al.* (2006). Extensively drug-resistant tuberculosis as a cause of death in patients co-infected with tuberculosis and HIV in a rural area of South Africa. *The Lancet, 368*(9547), 1575-1580. doi:10.1016/S0140-6736(06)69573-1

George, L. K. (2001). The social psychology of health *Handbook of aging and the social sciences* (5th ed., Vol. 5, pp. 217-235). San Diego: Academic press.

Gilbert, K. L., Quinn, S. C., Goodman, R. M., *et al.* (2013). A meta-analysis of social capital and health: A case for needed research. *Journal of Health Psychology, 18*(11), 1385-1399. doi:10.1177/1359105311435983

Hong, S., Zhang, W., & Walton, E. (2014). Neighborhoods and mental health: Exploring ethnic density, poverty, and social cohesion among Asian Americans and Latinos. *Social Science & Medicine, 111*, 117-124. doi:10.1016/j.socscimed.2014.04.014

Idler, E. L., & Benyamini, Y. (1997). Self-Rated Health and Mortality: A Review of Twenty-Seven Community Studies. *Journal of Health and Social Behavior, 38*(1), 21-37. doi:10.2307/2955359

Idler, E. L., & Kasl, S. V. (1995). Self-Ratings of Health: Do they also Predict change in Functional Ability? *The Journals of Gerontology: Series B, 50B*(6), S344-S353. doi:10.1093/geronb/50B.6.S344

Ijumba, P., Day, C., & Ntuli, A. (2003). *South African Health Review*. Durban: Health Systems Trust.

Inoue, S., Yorifuji, T., Takao, S., *et al.* (2013). Social Cohesion and Mortality: A Survival Analysis of Older Adults in Japan. *American Journal of Public Health, 103*(12), e60-e66. doi:10.2105/AJPH.2013.301311

Kawachi, I., & Berkman, L. (2000). Social cohesion, social capital, and health. *Social epidemiology*, 174-190.

Kawachi, I., Kennedy, B. P., Lochner, K., *et al.* (1997). Social capital, income inequality, and mortality. *American Journal of Public Health, 87*(9), 1491-1498.

Kleinbaum, D. G., & Mitchel, K. (2010). Introduction to logistic regression *Logistic Regression*. New York: Springler.

Krech, R. (2011). Social determinants of health: practical solutions to deal with a well-recognized issue. *Bulletin of the World Health Organization, 89*(10), 703-703. doi:10.1590/S0042-96862011001000003

Lagisetty, P. A., Wen, M., Choi, H., *et al.* (2015). Neighborhood Social Cohesion and Prevalence of Hypertension and Diabetes in a South Asian Population. *Journal of Immigrant and Minority Health*, 1-8. doi:10.1007/s10903-015-0308-8

Macintyre, S., & Ellaway, A. (2000). Neighbourhood cohesion and health in socially contrasting neighbourhoods: implications for the social exclusion and public health agendas. *Health Bulletin, 58*(6), 450-456.

Mackenbach, J. D., Lakerveld, J., Lenthe, F. J., *et al.* (2016). Neighbourhood social capital: measurement issues and associations with health outcomes. *obesity reviews, 17*(S1), 96-107.

Mair, C., Diez Roux, A. V., & Morenoff, J. D. (2010). Neighborhood stressors and social support as predictors of depressive symptoms in the Chicago Community Adult Health Study. *Health & Place, 16*(5), 811-819. doi:10.1016/j.healthplace.2010.04.006

Mair, C., Diez Roux, A. V., Shen, M., *et al.* (2009). Cross-Sectional and Longitudinal Associations of Neighborhood Cohesion and Stressors with Depressive Symptoms in the Multiethnic Study of Atherosclerosis (MESA). *Annals of epidemiology, 19*(1), 49-57. doi:10.1016/j.annepidem.2008.10.002

Malmström, M., Sundquist, J., & Johansson, S. E. (1999). Neighborhood environment and self-reported health status: a multilevel analysis. *American Journal of Public Health, 89*(8), 1181-1186. doi:10.2105/AJPH.89.8.1181

Marmot, M. (2004). Status syndrome. *Significance, 1*(4), 150-154. doi:10.1111/j.1740-9713.2004.00058.x

Marmot, M. (2005). Social determinants of health inequalities. *The Lancet, 365*(9464), 1099-1104.

Marmot, M., & Bell, R. (2012). Fair society, healthy lives. *Public health, 126*(Supplement 1), S4-S10. doi:http://dx.doi.org/10.1016/j.puhe.2012.05.014

Martin, K. R., Shreffler, J., Schoster, B., *et al.* (2010). Associations of perceived neighborhood environment on health status outcomes in persons with arthritis. *Arthritis Care & Research, 62*(11), 1602-1611. doi:10.1002/acr.20267

Mayosi, B. M., & Benatar, S. R. (2014). Health and Health Care in South Africa — 20 Years after Mandela. *New England Journal of Medicine, 371*(14), 1344-1353. doi:10.1056/NEJMsr1405012

Mayosi, B. M., Lawn, J. E., van Niekerk, A., *et al.* (2012). Health in South Africa: changes and challenges since 2009. *The Lancet, 380*(9858), 2029-2043. doi:10.1016/S0140-6736(12)61814-5

McKelvey, R. D., & Zavoina, W. (1975). A statistical model for the analysis of ordinal level dependent variables. *Journal of Mathematical Sociology, 4*, 103-112.

Mkhonto, S. S., Labadarios, D., & Mabaso, M. L. H. (2012). Association of body weight and physical activity with blood pressure in a rural population in the Dikgale village of Limpopo Province in South Africa. *BMC Research Notes, 5*, 118. doi:10.1186/1756-0500-5-118

Moore, K. A., Hirsch, J. A., August, C., *et al.* (2016). Neighborhood Social Resources and Depressive Symptoms: Longitudinal Results from the Multi-Ethnic Study of Atherosclerosis. *Journal of Urban Health, 93*(3), 572-588. doi:10.1007/s11524-016-0042-0

Moorman, S. M., Stokes, J. E., & Morelock, J. C. (2016). Mechanisms linking neighborhood age composition to health. *The Gerontologist*, gnv687.

Morenoff, Jeffrey D. (2003). Neighborhood Mechanisms and the Spatial Dynamics of Birth Weight. *American Journal of Sociology, 108*(5), 976-1017. doi:10.1086/374405

Mulvaney-Day, N. E., Alegría, M., & Sribney, W. (2007). Social cohesion, social support, and health among Latinos in the United States. *Social Science & Medicine, 64*(2), 477-495. doi:10.1016/j.socscimed.2006.08.030

National Planning Commission. (2012). *National Development Plan 2030: Our Future-Make it Work*. Retrieved from Pretoria:

Patrick, D. L., & Erickson, P. (1993). Assessing health-related quality of life for clinical decision-making. In S. R. Walker & R. M. Rosser (Eds.), *Quality of Life Assessment: Key Issues in the 1990s* (pp. 11-63): Springer Netherlands.

Pattussi, M. P., Olinto, M. T. A., Rower, H. B., *et al.* (2016). Individual and neighbourhood social capital and all-cause mortality in Brazilian adults: a prospective multilevel study. *Public health, 134*, 3-11.

Pearce, N., & Davey, S. G. (2003). Is Social Capital the Key to Inequalities in Health? *American Journal of Public Health, 93*(1), 122-129. doi:10.2105/AJPH.93.1.122

Peltzer, K. (2012). Sociodemographic and health correlates of sleep problems and duration in older adults in South Africa. *South African Journal of Psychiatry, 18*(4), 150-156.

Peltzer, K., & Phaswana-Mafuya, N. (2013). Depression and associated factors in older adults in South Africa. *Global Health Action, 6*(0).

Peltzer, K., Szrek, H., Ramlagan, S., *et al.* (2015). Depression and social functioning among HIV-infected and uninfected persons in South Africa. *AIDS Care, 27*(1), 41-46. doi:10.1080/09540121.2014.946383

Presidency, S. (2008). *Towards a fifteen year review synthesis report*. Retrieved from Pretoria:

Putrik, P., de Vries, N. K., Mujakovic, S., *et al.* (2015). Living environment matters: relationships between neighborhood characteristics and health of the residents in a Dutch municipality. *Journal of community health, 40*(1), 47-56.

Rios, R., Aiken, L. S., & Zautra, A. J. (2011). Neighborhood Contexts and the Mediating Role of Neighborhood Social Cohesion on Health and Psychological Distress Among Hispanic and Non-Hispanic Residents. *Annals of Behavioral Medicine, 43*(1), 50-61. doi:10.1007/s12160-011-9306-9

Roberts, B., & Struwig, J. (2012). *South African Social Attitudes Survey (SASAS) 2012: Questionnaire 3 - All provinces*.

Robinette, J. W., Charles, S. T., Mogle, J. A., *et al.* (2013). Neighborhood cohesion and daily well-being: Results from a diary study. *Social Science & Medicine, 96*, 174-182. doi:10.1016/j.socscimed.2013.07.027

Ross, C. E., & Mirowsky, J. (2001). Neighborhood Disadvantage, Disorder, and Health. *Journal of Health and Social Behavior, 42*(3), 258-276. doi:10.2307/3090214

Ruijsbroek, A., Droomers, M., Hardyns, W., *et al.* (2016). The interplay between neighbourhood characteristics: The health impact of changes in social cohesion, disorder and unsafety feelings. *Health & Place, 39*, 1-8. doi:10.1016/j.healthplace.2016.02.001

Sampson, R. J., Morenoff, J. D., & Earls, F. (1999). Beyond Social Capital: Spatial Dynamics of Collective Efficacy for Children. *American Sociological Review, 64*(5), 633-660. doi:10.2307/2657367

Sampson, R. J., Raudenbush, S. W., & Earls, F. (1997). Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy. *Science, 277*(5328), 918-924. doi:10.1126/science.277.5328.918

Shisana, O., Rehle, T., Simbayi, L. C., *et al.* (2014). *South African National HIV Prevalence, Incidence and Behaviour Survey, 2012*: HSRC Press.

Sibanda, A., & Lehloenya, G. (2005). Race and Gender Gaps in Education. *2005) The Demography of South Africa. ME Sharpe Inc*, 253-265.

Simons, R. L., Simons, L. G., Burt, C. H., *et al.* (2005). Collective efficacy, authoritative parenting and delinquency: A longitudinal test of a model integrating community-and family-level processes. *Criminology, 43*(4), 989-1029.

Sooman, A., & Macintyre, S. (1995). Health and perceptions of the local environment in socially contrasting neighbourhoods in Glasgow. *Health & Place, 1*(1), 15-26.

Stafford, M. A. I., McMunn, A., & De Vogli, R. (2011). Neighbourhood social environment and depressive symptoms in mid-life and beyond. *Ageing and Society, 31*(06), 893-910.

Stanley, D. (2003). What Do We Know about Social Cohesion: The Research Perspective of the Federal Government's Social Cohesion Research Network. *The Canadian Journal of Sociology / Cahiers canadiens de sociologie, 28*(1), 5-17. doi:10.2307/3341872

Statistics South Africa. (2011). *Mid-year population estimates, 2011*. Retrieved from

Statistics South Africa. (2016). *Mid-year population estimates, 2016*. Retrieved from South Africa:

Sundquist, K., Theobald, H., Yang, M., *et al.* (2006). Neighborhood violent crime and unemployment increase the risk of coronary heart disease: A multilevel study in an urban setting. *Social Science & Medicine, 62*(8), 2061-2071. doi:10.1016/j.socscimed.2005.08.051

Walker, L., Reid, G., & Cornell, M. (2004). Waiting to happen: HIV. *AIDS in South*.

Webber, M., Huxley, P., & Harris, T. (2011). Social capital and the course of depression: Six-month prospective cohort study. *Journal of Affective Disorders, 129*(1–3), 149-157. doi:10.1016/j.jad.2010.08.005

Whiteside, A., & Sunter, C. (2000). *AIDS: the challenge for South Africa*: Human & Rosseau.

Wilson-Genderson, M., & Pruchno, R. (2013). Effects of neighborhood violence and perceptions of neighborhood safety on depressive symptoms of older adults. *Social Science & Medicine, 85*, 43-49. doi:10.1016/j.socscimed.2013.02.028

Windmeijer, F. A. G. (1995). Goodness-of-fit measures in binary choice models. *Econometric Reviews, 14*, 101-116.

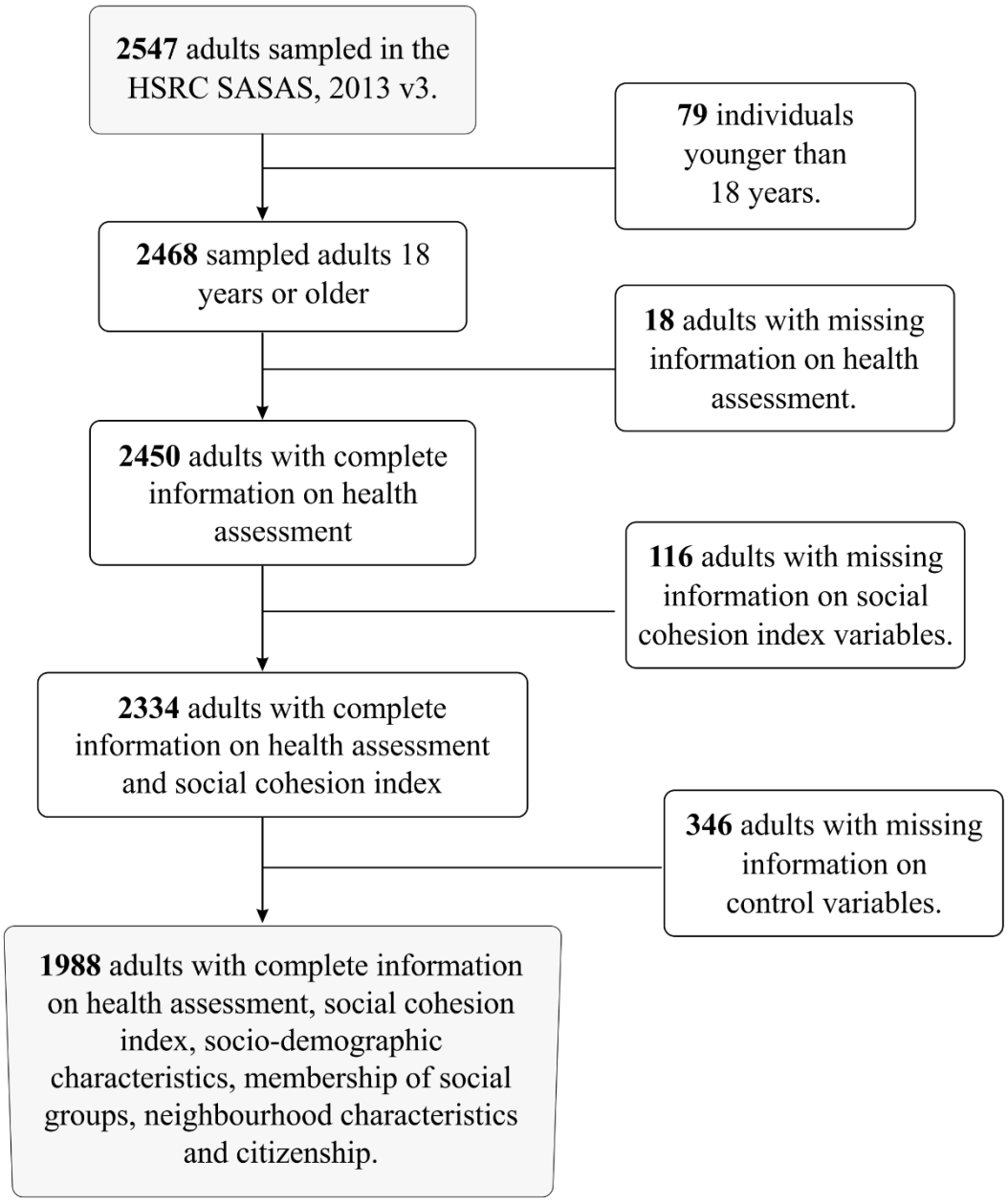
World Bank. (2011). Retrieved from http://data.worldbank.org/indicator/SI.POV.GINI?end=2011&start=1981&year_high_desc=true

World Health Organization. (2013). *Global tuberculosis report 2013*. Geneva, Switzerland: World Health Organization.

Xie, Z. (2015). Termination of Labor Contracts *Labor Law in China* (pp. 91-108): Springer Berlin Heidelberg.

APPENDIX

APPENDIX A: Sample Selection Procedure



Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation

APPENDIX B: Tabular presentation of some of the reviewed articles

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
Abdul-Sattar & Abou El Magd, 2014	Association of perceived neighbourhood characteristics, socioeconomic status and rural residency with health outcomes in Egyptian patients with systemic lupus erythematosus: one centre study.	Level of Analysis: Individual Study Setting: Egypt Study Population: Adults 18 years or older Study Sample: 80 patients affected with SLE in Egypt	Health status was assessed using three measures. • The Systemic Lupus Activity Questionnaire (SLAQ) is a validated 24-item weighted questionnaire on measuring disease activity over the 3 months preceding interview. • Physical functioning was measured using the Medical Outcomes Study Short Form-36 Health Survey (SF-36) physical functioning scale which is a generic instrument providing data to describe the quality of life as a dimension of self-reported health status. • Depressive symptoms were measured using the Center for Epidemiologic Studies Depression (CES-D) scale. This is a self-report scale measuring symptoms associated with depression based upon how respondents felt during the past week. Items are scored from 0 (rarely) to 3 (most or all the time)	Social cohesion and trust scale was developed by Sampson et al. Chronbach's α for the social cohesion was 0.79	Worse perceived social cohesion significantly associated with disease activity and depression symptoms scores. Adult patients had increased odds of depressive symptoms and higher disease activity scores if they perceived poor neighbourhood social cohesion.	Study Strengths: Low response rate of 38%; prone to selection bias; study did not address Study Weakness(es): All patients involved in the survey were from only one centre

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
Ahern & Galea (2011)	Collective Efficacy and Major Depression in Urban Neighbourhoods	Level of Analysis: Individual Study Setting: New York Study Population: Adults 18 years or older in New York. Study Sample: 80 patients affected with SLE in Egypt	Major depression was assessed by using the Patient Health Questionnaire-9, a valid and reliable measure of current depression symptoms. To meet the criteria for major depression, 5 or more of the 9 symptoms have to have been present more than half of the days over the past 2 weeks (suicidal ideation counts regardless of duration), and 1 symptom must be depressed mood or anhedonia.	The social cohesion subscale includes 5 items which were rated on a Likert scale. These items assessed residents' perceptions of the extent to which their neighbours are close-knit, are helpful, get along, share values, and are trustworthy. Cronbach's α for this scale was 0.64.		
Chambers, et al. (2015)	Depressive Symptomology and Hostile Affect among Latinos Using Housing Rental Assistance: the AHOME Study	Level of Analysis: Individual Study Setting: The Bronx and New York, USA. Study Population: Adult Latinos living in one of the poorest urban counties in the USA—the Bronx, New York. Sample: 385 adults (≥ 18 years) Latinos living in the Bronx, New York.	Measures of health in this study are depressive symptomatology and hostility. Depressive symptomatology was measured using the Centre for Epidemiological Studies Depression Short Form 10 item scale (CES-D). CES-D short form is scored by summing the responses across all 10 items of the scale (items scored 0 to 3). Cronbach's alpha for this scale was 0.84. A score of 10 or more was considered positive for depressive symptomology. Hostility was measured by drawing items from the the larger Cook-Medley Hostility Scale. The scale encompasses questions on dislike,	Social cohesion was measured by determining the degree to which respondents agreed with the following: people around here are willing to help their neighbours; this is a close-knit or unified neighbourhood; people in this neighbourhood can be trusted; people in this neighbourhood do not share the same values; and people in this neighbourhood generally don't get along with each other. Response options were Likert scaled from strongly agree to strongly	Perceptions of social cohesion in the neighbourhood were associated with lower levels of depressive symptomology and hostility.	Estimates from the study could be affected by endogeneity and sample selection bias. Endogeneity may arise from the fact that individuals must choose to apply for housing assistance; this decision may be correlated with unobserved variables that also influence the outcomes. Measure of hostility used in the study had a Cronbach α score less than 0.70 depicting a poor internal consistency.

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
			disappointment, annoying habits, anger, and impatience. Items for this scale were summed across all five items. The resulting scale (range 0 to 5) had a low internal reliability measured using Cronbach's α of 0.53. An individual with a score of four or five was considered positive for hostility.	disagree (coded 1 to 4). An exploratory factor analysis indicated that the first three items were highly intercorrelated; thus, a scale tapping into social cohesion was created by taking the mean of responses to these items (Cronbach's α= 0.81).		
Echeverría et al., (2008)	Associations of neighbourhood problems and neighbourhood social cohesion with mental health and health behaviours: The Multi-Ethnic Study of Atherosclerosis.	Level of Analysis: Individual and neighbourhood Study Setting: USA. Study Population: Adults 45–84 years of age, free of clinically apparent cardiovascular disease and recruited from six communities in the USA: Baltimore City and Baltimore County, Maryland; Chicago, Illinois; Forsyth County, North Carolina; Los Angeles County, California; New York,	Measures of health in this study are depression and health related behaviours such as smoking, binge drinking, and regular exercise. • Depression was assessed by drawing from the 20-item measures of depression from the CES-D. This scale ranged from 0–60. • Participants were classified as current smokers if they had ever smoked 100 cigarettes or more in their lifetime and reported smoking cigarettes in the past 30 days. • Based on prior work (Centres for Disease Control and Prevention (CDC), 2004), individuals consuming five or more drinks on one occasion in the past month were categorized as 'binge' drinkers. • Participants were classified as not walking for exercise if they	Neighbourhood social cohesion was assessed by drawing from the item measures of social cohesion by Sampson et al., (1997). These items assessed closeness within the neighbourhood, willingness to help, trust, and neighbours share the same values (Sampson et al., 1997). The social cohesion score was summed up and divided into roughly equal tertiles, with the highest tertile representing greater social cohesion. Cronbach α for this scale was 0.90.	Individuals living in neighbourhoods with low social cohesion had higher CES-D scores than those living in neigbourhoods with high social cohesion after adjustment for individual-level covariates. They also had a higher likelihood of smoking and not walking for exercise. Unlike depresion, smoking and regular exercise, neighbourhood social cohesion was not associated with drinking both after or before adjusting for	Study was unable to adjust for differences in the advertising and availability of tobacco and alcohol in the neighbourhoods, which could confound the associations observed between neighbourhood problems and neighbourhood social cohesion and smoking and drinking.

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
		New York; and St. Paul, Minnesota. Sample: 385 adults (≥ 18 years) Latinos living in the Bronx, New York.	reported that they had not walked for exercise in the past month.		covariates. Associations of social cohesion with CES-D remained statistically significant after adjusting for neighbourhood problems and neighbourhood socioeconomic characteristic.	
Erdem et al., (2016)	Socioeconomic Inequalities in Psychological Distress among Urban Adults: The Moderating Role of Neighbourhood Social Cohesion	Level of Analysis: Individual and neighbourhood Study Setting: The Netherlands Study Population: Adults aged 45–84 years, free of clinically apparent cardiovascular disease and recruited from six communities in the USA. These communities are Baltimore City and Baltimore County, Maryland; Chicago, Illinois; Forsyth County, North Carolina; Los Angeles County, California; New York,	Measure of health was depression with psychological distress as a proxy measure. It was measured using the Kessler Psychological Distress Scale (K10). The K10 scale consists of 10 questions that measures an individual's level of anxiety and depressive symptoms in the previous four weeks. This questions examined in an individual felt stressed out, nervous, hopeless, restless or fidgety, depressed, sad and worthless. Cronbach's (α) alpha for this scale was 0.92. A sum score was calculated (range 10–50), with higher scores reflecting more psychological distress.	At the individual-level, social cohesion was measured by drawing from five questions that encompassed shared values, solidarity, closeness and knowledge of one another. The social cohesion measure was derived using an ecometrics method described by Raudenbush and Sampson (1999). This method was used in nesting of social cohesion items within individuals, who in turn are nested within the neighborhoods.	Adjusting for a number of covariates, residence in low socially cohesive neighbourhoods was significantly associated with higher psychological distress	• Dichotomizing neighbourhood social cohesion at the midpoint into low or high cohesion, could have led to loss of variation. • Observed relationships might be due to selective migration such that depressed persons may be less likely to move away from neighbourhoods with low social cohesion, and adults with low psychological distress may more often move to more affluent and cohesive neighbourhoods.

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
		New York; and St. Paul, Minnesota. Sample: 18,173 adults 16 years or older in 211 neighbourhoods of the Netherlands.				
Fone et al., (2014).	Effect of neighbourhood deprivation and social cohesion on mental health inequality: a multilevel population-based longitudinal study	Level of Analysis: Individual and neighbourhood Study Setting: United Kingdom Study Population: Adults 18–74 years in the United Kingdom. Sample: 4426 adults between ages 18 and 74 years living in the United Kingdom	The measure of health in this study is change in mental health score (CMD) between baseline and follow-up. CMD was assesed by drawing 36-items from the Short-Form Health Survey (SF-36) version 2 and the 5-item Mental Health Inventory (MHI-5) subscale scores. The MHI-5 has been observed to be a robust measure of mental health among adults. The MHI-5 scale comprises five questions asking if respondents had been nervous, calm, happy, down hearted, or depressed in the past 4 weeks. Scores for each question were summed up and ranged from 5 to 25 such that higher scores indicated better mental health for each question. The scores were subsequently range-transformed to a final discrete scale ranging from zero to 100, where 100 represents the best level of mental health.	Neighbourhood social cohesion was derived using Buckner's Neighbourhood Cohesion scale (Buckner, 1988). Exploratory factor analysis was carried out and extraction was by principal component analysis and varimax rotation. Two components were extracted from which one that loaded items on trust and reciprocity was utilized in the study. Mean neighbourhood social cohesion scores were thereafter estimated and categorized into three categories of low, medium and high social cohesion with equal numbers of neighbourhoods in each category.	Over the 7 years follow up period, residing in a neigbourhood with medium or high social cohesion was strongly associated with improvements in mental health compared to living in a neighbourhood with low social cohesion.	• Study experienced a huge loss to follow-up (58%) of subjects. • There is the possibility of unmeasured confounding as a possible explanation for the study findings.

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
Fujisawa, Hamano, & Takegawa, (2009).	Social capital and perceived health in Japan: An ecological and multilevel analysis.	Level of Analysis: Individual and community Study Setting: Japan Study Population: Adults 20–79 years in Japan Sample: 1157 individuals nested within 206 enumeration districts	Perceived health was used as a measure of health and was drawn from the General Health (GH) perception items from the Japanese version of the Medical Outcomes Study Health Survey Short-Form (SF-36). The respondents were asked to rate their health in general, if they get sick a little easier than other people, if they are healthy as others and expect a worse health. All the items were rated on a 5-point Likert scale and combined to calculate the GH score, which ranged from 0 to 100, with higher scores indicating better health. At the individual level, the internal consistency reliability (Cronbach's alpha) for this scale was 0.83.	The community-level social cohesion index, individual responses to questions on perceived helpfulness, kindness, and greeting were aggregated to the community. The responses to these items were combined and summed to create the social cohesion index. At the individual level, the internal consistency reliability (Cronbach's alpha) for this scale was acceptably high at 0.72.	The social cohesion index, was statistically significant associated with GH. The multilevel model, after adjusting for individual social capital perceptions, indicated that the social cohesion index, showed a statistically significant association with GH	Limitations: • Due to sample size constraints, we were unable to test the robustness of the correlations between social capital and health across different levels of aggregation. • Due to the sampling design, it was difficult to explore more details of the dataset about the characteristics of each sampling unit, in the ED.
Hong, Zhang, & Walton (2014)	Neighbourhoods and mental health: Exploring ethnic density, poverty, and social cohesion among Asian Americans and Latinos	Level of Analysis: Individual and community Study Setting: United States Study Population: Adult Latinos and Asian Americans aged 18 years or older in any of the 50	The measure of health in this study is mental health. Respondents were asked, "How would you rate your overall mental health?" The responses were rated on a 5-point Likert scale with higher rating indicating better perceived overall mental health.	This paper uses the 4-item measure for assessing the cohesiveness of the respondent's neighbourhood by drawing from the items of Sampson et al. (1997). Respondents were asked if people in their neighbourhood can be trusted; get along with each other, willing to help, and look out for each	Social cohesion is positively associated with mental health for both Latinos and Asian Americans, suggesting that those who perceive their neighbourhoods as socially cohesive are more likely to have better mental health.	Limitations: • Study aggregated various and differing ethnic groups under broad categories. Even though they have differing experiences with immigration, time in the United States, language, educational attainment, and other factors that could contribute to differing

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
		states or Washington DC in the United States. <u>Sample:</u> 2095 Asian American adults residing in 259 census tracts, and 2554 Latino adults in 317 Census tracts.		another. Response categories were recoded so that high scores indicate higher levels of social cohesion.		neighbourhood environments. • Study was unable to account for selective migration into the neighbourhoods, making it impossible to know for certain that variation in mental health is due to true neighbourhood effects or the selection of certain families and individuals into certain neighbourhoods. Study focused on only two major neighbourhood structural contexts such as neighbourhood poverty and ethnic density. Other neighbourhood characteristics, may however explain the contribution of neighbourhood contexts to residents' mental health.
Lagisetty et al. (2015)	Neighbourhood Social Cohesion and Prevalence of Hypertension and Diabetes in a South Asian Population	<u>Level of Analysis:</u> Individual <u>Study Setting:</u> United States <u>Study Population:</u>	Measure of health were diagnosis of hypertension or type 2 diabetes at the time of baseline data collection. Seated resting blood pressure was measured three times with the average of the last 2 readings being used for analysis. Hypertension was defined using the	Perceived neighbourhood social cohesion, was measured using a well-validated five-item Likert scale. This item encompasses, helpingness, closeness, trust, shared values, and knowledge of	Hypertension and type 2 diabetes were significantly associated with high tertile neighbourhood social cohesion in unadjusted models but after adjusting for	<u>Limitations:</u> • Study sample is largely comprised of Asian Indian immigrants living in the San Francisco Bay and Chicago areas who have higher level of education and income and as such may not be

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
		Adults between the ages of 40–84 years with South Asian ancestry and can speak and/or read English, Hindi or Urdu <u>Sample:</u> 906 adults with South Asian ancestry with no physician diagnoses of heart attack, stroke or transient ischemic attack, heart failure, angina, use of nitroglycerin, a history of cardiovascular procedures, current atrial fibrillation, active treatment for cancer, life expectancy <5 years due to a serious medical illness, impaired cognitive ability, plans to move out of the study region in the next 5 years, living in or being on a waiting list for a nursing home, and weight >300 lbs.	Joint National Committee criteria as a systolic blood pressure (SBP) C140 mmHg and/or diastolic blood pressure (DBP) C90 mmHg or use of anti-hypertensive medication. Type 2 diabetes mellitus was defined using the American Diabetes Association definition for type 2 diabetes as a fasting plasma glucose C126 mg/dL2-hour post-load plasma glucose C200 mg/dL, or use of anti-hyperglycaemic mediations. All blood samples were obtained after a 12-h fast.	one another. For each scale, a score was created by taking the average across all items within the scale (Cronbach's a = 0.65). Scores were then divided into tertiles and defined as low, medium, and high neighbourhood social cohesion.	covariates, no statistically significant association was observed between perceived neighbourhood social cohesion and diagnosis of hypertension or type 2 diabetes. The prevalence of hypertension and type 2 diabetes however tended to decrease as social cohesion increased.	representative of all South Asians in the US. Adults with known cardiovascular disease or symptoms were excluded from the sample, so this sample likely represents an overall underestimation of type 2 diabetes and hypertension prevalence among South Asian Americans.
Mackenbach et al., (2016)	Neighbourhood social capital: Measurement issues and associations with health outcomes	<u>Level of Analysis:</u> Individual and community <u>Study Setting:</u>	• Self-rated health was measured using a single-item Visual Analogue Scale (41,42). Values along a continuous line with two end points ranged from 0 (worst) to	Social cohesion was identified from a factor analysis of neighbourhood social capital which was measured using a 13-item scale proposed by	Higher levels of social cohesion were not only associated with better self-rated health, lower odds of obesity and higher	<u>Limitations:</u> • Study was subject to selection bias and high non-response rate.

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
		Urban regions in Belgium, France, Hungary, the Netherlands and the United Kingdom. <u>Study Population:</u> Adults in five of the selected European neighbourhoods <u>Sample:</u> 5900 adults in 60 neighbourhoods.	100 (best), and participants were asked to indicate how they rated their general health by placing a mark on the line. Self-rated health was dichotomized at the median (score of 73 or higher). • Body mass index (BMI) was calculated as body weight (kilograms) divided by height (metres) squared as obtained from the survey. Overweight was defined as a BMI ≥ 25 and obesity as BMI ≥ 30 in accordance with WHO guidelines. • Obesity-related behaviours were measured using physical activity, sedentary behaviours and consumption of fruit, vegetables, fish, sweets, sugar-sweetened beverages and fast food. • Questions about leisure time physical activity (weekly minutes) and transport related physical activity (weekly minutes) were adapted from the validated international physical activity questionnaire. • Sedentary behaviours were measured using the validated Marshall questionnaire, which assesses different types of sedentary behaviours (average daily minutes of sitting).	Beenackers and colleagues to capture interactions and relationships in the neighbourhood. Cronbach's alpha for this factor was 0.86. Summary scores of social cohesion was calculated for each individual, with values ranging between 5–25.	fruit consumption, but also with prolonged sitting and less transport-related physical activity. Only associations with transport-related physical activity and sedentary behaviours were observed.	• The questionnaires used to assess obesity-related behaviours have known or suspected limitations, which may have led to biased estimates of behaviours. Despite sampling neighbourhoods that were heterogeneous in SES and housing density, neighbourhood level variation of social capital was relatively low (in comparison to individual-level variation in social capital).

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
			• Frequency of fruit and of vegetable consumption per week were each measured with a 1-item question as a proxy for diet quality. This variable was dichotomized at the median consumption per week: fruit <7 times, vegetables <7 times, fish <2 times, sweets ≥3 times, sugar-sweetened beverages ≥2 glasses, fast food ≥2 times. Leisure time physical activity and transport-related physical activity were dichotomised at less than 25 min per day.			
Mair, et al., (2010).	Cross-Sectional and Longitudinal Associations of Neighbourhood Cohesion and Stressors with Depressive Symptoms in the Multiethnic Study of Atherosclerosis (MESA)	Level of Analysis: Individual and neighbourhood Study Setting: Multiethnic Study of Atherosclerosis site in the US. Study Population: Adults between age 45 to 84 residing at three (Baltimore MD, Forsyth County NC, and New York City NY) of the six MESA sites where	• Depressive symptoms were measured in MESA participants at baseline and at two follow-up visits, using the 20-item Centre for Epidemiologic Studies Depression (CES-D) Scale. Each scale item is scored from 0-3, with a higher score representing more depressive symptoms. The total range of this scale was 0-60, with a score of 16 often used as a screening cut off for clinical depression.	Neighbourhood social cohesion scale was constructed from four items score similar to those of Mujahid et al (2007) and Sampson et al., (2003). Respondents were asked to assess certain features of their neighbourhood (a 1–mile area around their home). Cronbach alpha for this scale was 0.74 (social cohesion). This scale also had acceptable ecometric properties	Lower levels of social cohesion were associated with higher mean CES-D (depression) scores in both men and women. In general, the associations were stronger in women than in men.	Limitations: • The study used census tracts as proxies for the geographic area which could have underestimated the effects of interest as it is plausible that smaller geographic areas are more relevant than the census tracts we examined. Study was unable to examine interactions between neighbourhood characteristics and life events. it may be that

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
		neighbourhood-level data were collected. Sample: 3105 adults living in Chicago, IL drawn from 343 neighbourhood clusters.				stressful neighbourhood conditions interact with negative life events to cause depression.
Martin et al. (2010)	Associations of Perceived Neighbourhood Environment on Health Status Outcomes in Persons with Arthritis	Level of Analysis: Individual Study Setting: North Carolina, US. Study Population: Adults 18 years or older, spoke English fluently, and had current contact information. Sample: 696 adults 18 years or older, spoke English fluently, and had current contact information	Health status outcomes were assessed using the following 4 established measures. • Physical and mental health functioning were assessed using the SF-12 v.2 physical component summary (PCS) and the SF-12 v.2 mental component summary (MCS). Cronbach α for this measure was 0.90. PCS and MCS scores range from 0 to 100, with higher scores indicating better health. • Self-reported function was assessed using the disability scale of the Health Assessment Questionnaire (HAQ), which includes questions about 20 activities of daily living organized by 8 domains. Each item was scored from 0 to 3, with higher score representing greater disability. Each domain was	Social cohesion was assessed by drawing from 5 items measure in the works of Sampson and colleagues (1997). Responses to this question was rate using a 5-point Likert-response format with response categories ranging from 1 (strongly agree) and 5 (strongly disagree). Cronbach's for this scale was 0.81.	Results from separate adjusted models indicated that perceived neighbourhood characteristics were statistically significant for each health status outcome (except walkability and MCS) after adjusting for covariates. Individuals perceiving lower social cohesion scored lower on mental health, had a greater odds of reporting depressive symptoms and scored higher on the disability scale.	Limitations: • Study was unable to adjust for potential confounders because the data had no information on participants' length of residence. Same-source bias could have biased findings from the study such that other characteristics may have influenced one's perception such that adults with lower mental health at the time of the survey have biased neighbourhood perceptions.

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
			separately scored, with the total score averaged over the 8 domains. • Depressive symptoms were assessed using the Centre for Epidemiologic Studies Depression Scale (CES-D) and is a 20-item self-report scale yielding scores ranging from 0 to 60, with higher scores indicating greater levels of depressive symptoms. CES-D scores were dichotomized at a cut point of 16 (<16 or ≥16) in this study. Cronbach's α for this scale was 0.92.			
Moore, et al. (2016)	Neighbourhood Social Resources and Depressive Symptoms: Longitudinal Results from the Multi-Ethnic Study of Atherosclerosis	Level of Analysis: Individual Study Setting: North Carolina, US. Study Population: Adults between age 45 to 84 residing at three (Baltimore MD, Forsyth County NC, and New York City NY) of the six MESA sites where neighbourhood-level data were collected. Sample: 696 adults 18 years or older, spoke English	The primary outcome was participants' depressive symptoms measured using the 20-item Centre for Epidemiologic Studies Depression Scale (CES-D). Each scale item is scored from 0 to 3, with a higher score representing more depressive symptoms; the total score for this scale range from 0–60 points. CES-D was measured at all exams except exam 2. At each visit, an inventory of medications taken within the last 2 weeks was collected.	• Social cohesion was assessed from four items question collected at baseline and exam 5. Participants were asked to describe the environment within a 20-min walk around their home on a five-point scale ranging from strongly agree to strongly disagree. The means of the responses were derived and used as the individual perceptions of social cohesion. Neighbourhood aggregate measures of social cohesion was assessed by pooling responses from a	Adjusting for relevant covariates, higher social cohesion was associated with lower CES-D at baseline. Higher perceived social cohesion was not associated with progression of CES-D over 10 years. Within-person increases in social cohesion was associated with decreases in CES-D but the relationship was not significant.	

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
		fluently, and had current contact information		random sample of residents of selected census tracts in the study sites together with the MESA respondents. An objective reality of the neighbourhood was obtained by averaging the responses for all the respondents.		
Moorman, Stokes, & Morelock, (2016).	Mechanisms Linking Neighbourhood Age Composition to Health	<u>Level of Analysis:</u> Individual and Neighbourhood <u>Study Setting:</u> The U.S. <u>Study Population:</u> Adults aged 30–84 who participated in the 2004–2006 wave of National Survey of Midlife Development in the United States <u>Sample:</u> 4,017 adults aged 30–84 nested within 3,714 census tracts in the United States.	• Psychological Well-Being was measure using a 43-item scale from the work of Ryff & Keyes (1995). Responses ranged from 1 (strongly disagree) to 7 (strongly agree), such that higher values indicated greater well-being. Scores were summed and then divided by 43 to generate a mean. Cronbach α for this scale was 0.94. Self-Rated Health was assessed by asking participants to rate their health in general. This measure of health was rated on a 5-Likert scale from 1 (poor) to 5 (excellent).	Social cohesion was measured using a three-item scale by Keyes, (1998). Responses were rated on a 7-point Likert scale such that higher values indicated greater social cohesion. Cronbach α for this scale was 0.74.	Higher social cohesion was significantly associated with better self-rated health and well-being	<u>Limitations:</u> • The study used a number of proxy measures (such as census tract in place of neighbourhoods). As such the relationship between neighbourhood characteristics and health may not have been adequately captured by the census tract approach because residents' subjective and lived experiences of their neighbourhood may differ from their census tract boundaries. The two data sources used here were cross-sectional and collected at different points in time (upto a gap of 4–6 years between the two data sources). The study

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
						could therefore not ascertain if mediators precede health and well-being causally.
Mulvaney-Day, Alegria, & Sribney, (2007)	Social cohesion, social support, and health among Latinos in the United States	Level of Analysis: Individual and Neighbourhood Study Setting: The U.S. Study Population: Latino adults 18 years or older in the United States Sample: 2554 Latino adults from four distinct subgroups in the US	Measures of health in this study were self-rated physical and mental health. Physical health was assessed by asking how respondents would rate their overall physical health. These responses were rated on a 5-Likert scale. Self-rated mental health was assessed using a parallel question rated on a 5-point Likert scale.	Social Cohesion was assessed by asking respondents, questions on trust, closeness, helpness, and care. This items were combined and rated on a scale of 4–16. Cronbach's for this scale were 0:81 for both the English and Spanish interviews.	Neighbourhood social cohesion was not significantly related to either self-rated physical or mental health, after accounting for the effects of the other social connection variables.	
Pattussi, et al, (2016)	Individual and neighbourhood social capital and all-cause mortality in Brazilian adults: a prospective multilevel study	Level of Analysis: Individual and Neighbourhood Study Setting: Sao Leopoldo municipality, Rio Grande do Sul (RS) in the south of Brazil. Study Population: Adults (aged 18 years or more) residing in 38 neighbourhoods (census	Participants' deaths were ascertained via the official death registration records of the Rio Grande do Sul state. The vital status of those not present at home was confirmed with neighbours and at the time of interview.	Social cohesion was identified from an exploratory and confirmatory factor analysis were fitted on five items drawn from the works of Sampson and Colleagues (1997). At the individual level items were summed up and the variable categorised based on the tertiles of distribution. At the	After controlling for individual characteristics, individual perceptions of community cohesion were associated with a reduced risk of all-cause mortality as well as mortality from cardiovascular disease. However, no statistically	Limitations: • The use of administrative boundaries to define the contours of neighbourhood social capital could have resulted in misclassification or inaccurate estimations of effects of neighbourhood characteristics on health. Potentially relevant factors that might have confounded the association such as depression, loneliness, and

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
		blocks) in Sao Leopoldo municipality in the south of Brazil. Sample: 846 adults (aged 18 years or more) residing in 38 neighbourhoods (census blocks)		neighbourhood level, the mean score for each participant was aggregated up to the neighbourhood level.	significant relationship was found between community cohesion and mortality risk.	living alone were not collected at baseline and as such, residual bias could have limited study findings.
Putrik et al (2014)	Living Environment Matters: Relationships Between Neighbourhood Characteristics and Health of the Residents in a Dutch Municipality	Level of Analysis: Individual and Neighbourhood Study Setting: Maastricht municipality, the Netherlands Study Population: Adults aged 18 years or over in Maastricht municipality, Southern Limburg, the Netherlands. Sample: 9,879 adults (aged 18 years or more) residing in Maastricht municipality, the Netherlands	• Self-rated health was measured by asking respondents would rate their health in general with response categories dichotomized into good or poor. Presence of depressive symptoms was measured by the Kessler Physiological Distress Scale used as a proxy for mental health.	• Social cohesion in this study was part of an aggregated measure from the 74 environmental variables. All questions that were relevant to the environment were identified, assessed and subjected to an exploratory factor analyses that identified 18 conceptually statistically consistent factors. Each factor (including social cohesion) was labelled based on face validity with Cronbach's Alphas of 0.70. A total score was computed for each factor and recoded to a scale of 0–10, where ten corresponded to the most favourable answer. Neighbourhood level was measured using the means	Residents in higher social cohesion tended to report better general and mental health, regardless of their age, gender and socio-economic position (as measured by education and income group). A significant relationship was however not observed for mental health outcome (high level of depressive symptoms).	Limitations: • The survey data (particularly data on income) were self-reported, with possible implications for accuracy. • Data on neighbourhood environment and health were collected from the same individuals and hence the possibility of a same-source bias Furthermore, there was a relatively high number of missing values in the study (7.6 %).

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
				of computed aggregated measures per neighbourhood.		
Rios et al (2012)	Neighbourhood Contexts and the Mediating Role of Neighbourhood Social Cohesion on Health and Psychological Distress Among Hispanic and Non-Hispanic Residents	Level of Analysis: Individual and Neighbourhood Study Setting: Arizona, US. Study Population: Adult (18 years or older) residents of bMaricopa County, Arizona. Sample: 3,098 Hispanic and non-Hispanic residents within 597 census tracts in metropolitan Phoenix, Arizona.	• A single-item assessed self-rated global health from the SF-36 by asking how respondents would rate their health in general, rated on a five-point scale from poor to excellent. Psychological Distress was assessed using six items from the Kessler Psychological Distress Scale measuring depressive and anxious symptoms rated on a five-point scale. Using a time frame of, respondents were asked how often they felt "nervous," "hopeless," "restless or fidgety," "so depressed so that nothing could cheer you up," "that everything was an effort," and "worthless" in the last 30 days. Scale scores were constructed using mean scores and Cronbach's alpha was 0.80.	Five items measured the Social Cohesion dimension of the Collective Efficacy Scale from the work of Sampson and colleagues (1997). The items, rated on a four-point scale measured trust, shared values, and helpness. Cronbach's alpha was 0.78.	Within neighbourhoods, individual ratings of NSC, relative to averages of social cohesion within the neighbourhood, were associated with higher self-rated health and lower psychological distress.	Limitations: • Survey used a telephone-based sampling design and underrepresentation some residents among the sample thereby placing limits on the generalizability of the findings. Association may reflect bidirectional causality due to same-source bias.
Ruijsbroek eet al (2016)	The interplay between neighbourhood characteristics: The health impact of changes in social cohesion, disorder	Level of Analysis: Individual and Neighbourhood Study Setting: The Netherlands.	Self-rated health was measured by the single question that asked how respondents will rate their health in general. Responses to this question were rated on a 5-point Likert-scale and later dichotomized into good	Respondents were asked whether they agreed with the following statements: knowledge of one another, friendliness, solidarity, shared values, and closeness. Answers were	Deteriorating social cohesion was negatively associated with general health while improvement in social cohesion was associated with better	Limitations: Although a longitudinal study, the study had a short observation time to detect health effects.

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
	and unsafety feelings	Study Population: Adults 18 years or older in 2100 four-digit Dutch postal code areas. Sample: 43,635 adults living in 2100 four-digit Dutch postal code areas.	general health versus poor general health.	rated on a 5-point Likert scale from totally disagree to totally agree. A higher score indicated more social cohesion. Cronbach's α = 0.85. Neighbourhood level social cohesion was assessed by aggregating individual scores for social cohesion to the neighbourhood.	general health of the population.	
Peltzer (2012)	Sociodemographic and health correlates of sleep problems and duration in older adults in South Africa	Level of Analysis: Individual Study Setting: South Africa. Study Population: Older South Africans 50 years or older. Sample: 433,840 South African adults aged 50 years or older.	Health status of the adults was assesed by asking respondents how much of a problem they had with sleeping. Response to these question ranged from 1 (none) to 5 (extreme/cannot do).	Social cohesion was measured by asking respondents how often they had participated in about nine activities in the preceding 12 months. Cronbach alpha for this scale was 0.73.	Multivariate analysis showed that lack of social cohesion was associated with having current sleeping problems.	Limitations: The social cohesion construct measures social participation which in previous studies are closely related to social capital. More importantly, some of the activities might not have occurred in the neighbourhood.
Peltzer & Phaswana-Mafuya. (2013)	Depression and associated factors in older adults in South Africa	Level of Analysis: Individual Study Setting: South Africa.	Health of older adults was measured as symptom-based depression in the past 12 months. This was based on the International	Social cohesion was measured by asking respondents how often they had participated in about nine activities in the	Deteriorating social cohesion was negatively associated with general health while improvement in	Limitations: The social cohesion construct measures social participation which in previous studies are closely

Authors (Year)	Title	Study Description	Measure of Health	Measure of Social Cohesion	Results/Findings	Evaluation
		Study Population: Older South Africans 50 years or older. Sample: 433,840 South African adults aged 50 years or older.	classification of diseases, 10th revision.	preceding 12 months. Cronbach alpha for this scale was 0.73.	social cohesion was associated with better general health of the population.	related to social capital. More importantly, some of the activities might not have occurred in the neighbourhood.

APPENDIX C: Test for Specification Error

```
. linktest, vce(robust) nolog

Ordered logistic regression                     Number of obs     =      1,988
                                                Wald chi2(2)      =     258.65
                                                Prob > chi2       =     0.0000
Log pseudolikelihood =  -24246854               Pseudo R2         =     0.1022
```

OSR_Health	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
_hat	.9149856	.1653365	5.53	0.000	.590932	1.239039
_hatsq	-.0262009	.0440138	-0.60	0.552	-.1124662	.0600645
/cut1	-3.137413	.1630684			-3.457021	-2.817805
/cut2	-1.472896	.1438125			-1.754763	-1.191029

APPENDIX D: Test for Parallel Regression Assumption

```
. oparallel

Tests of the parallel regression assumption
```

	Chi2	df	P>Chi2
Wolfe Gould	31.65	22	0.084
Brant	31.41	22	0.088
score	32.78	22	0.065
likelihood ratio	32.72	22	0.066
Wald	34	22	0.049

APPENDIX E: Brant Test for Parallel Regression Assumption across Predictor Variables

Variable	y_gt_0	y_gt_1
SCT_Quantile		
Lowest Te..	-0.62	-0.327
	-3.93	-2.6
Moderate ..	-0.097	-0.281
	-0.61	-2.29
Age_Single~s	-0.049	-0.04
	-8.72	-8.35
Sex		
female	-0.357	-0.209
	-2.57	-1.95
Race		
Black Afr..	-0.594	-0.491
	-2.96	-3.24
Race		
Indian or..	-0.518	-0.365
	-1.89	-1.74
White	-0.065	-0.043
	-0.23	-0.21
Marital_Stat		
Married	0.228	0.275
	1.37	2.08
Sep/Divor~d	0.108	0.258
	0.42	1.14
Widowed	0.014	0.074
	0.06	0.34
Education		
< Seconda..	-0.097	0.223
	-0.34	1.01
Secondary..	0.162	0.385
	0.66	2.29
Employment_Status		
I am curr..	-0.402	-0.214
	-2.32	-1.63
I never h..	-0.459	-0.295
	-2.51	-2.15
HWealth_Stat		
Rich	1.062	0.845
	6.71	7.21
HWealth_Stat		
Poor	-0.621	-0.359
	-3.94	-2.47
Religion		
no	0.016	-0.002
	0.08	-0.01
Trade_Union		
Yes, I am..	0.637	0.601
	2.19	2.56
Trade_Union		
No, never..	0.63	0.636
	3.07	3.3
Safety_Feelings		
Unsafe	-0.187	-0.27
	-1.36	-2.5
Residence		
Rural	-0.04	-0.112
	-0.26	-0.91
Years_in_Neigh	-0.004	-0.008
	-0.85	-1.88
_cons	3.997	1.577
	8.99	4.61

Brant test of parallel regression assumption

	chi2	p>chi2	df
All	31.41	0.088	22
1.SCT_Quantile	3.79	0.052	1
2.SCT_Quantile	1.38	0.239	1
Age_SingleYrs	2.52	0.113	1
2.Sex	1.20	0.273	1
1.Race	0.28	0.594	1
3.Race	0.34	0.562	1
4.Race	0.01	0.936	1
1.Marital_Stat	0.08	0.771	1
2.Marital_Stat	0.36	0.551	1
3.Marital_Stat	0.07	0.796	1
1.Education	1.29	0.257	1
2.Education	0.85	0.356	1
2.Employment_Status	1.27	0.260	1
3.Employment_Status	0.87	0.350	1
1.HWealth_Stat	2.01	0.157	1
3.HWealth_Stat	2.90	0.089	1
2.Religion	0.01	0.927	1
1.Trade_Union	0.02	0.900	1
3.Trade_Union	0.00	0.978	1
2.Safety_Feelings	0.39	0.534	1
2.Residence	0.25	0.617	1
Years_inNeighbourhood	0.68	0.410	1

A significant test statistic provides evidence that the parallel regression assumption has been violated.

APPENDIX F: Test for Multicollinearity

```
. pwcorr OSR_Health SCT_Quantile Age_SingleYrs Sex Race Marital_Stat Education Employment_Status HWealth_Stat Religion Trade_Union Safety_Feelings Residence Years_inNeighbourhood, ob
> s star(0.05)sig
```

	OSR_He~h	SCT_Qu~e	Age_Si~s	Sex	Race	Marita~t	Educat~n
OSR_Health	1.0000						
	1988						
SCT_Quantile	0.0834*	1.0000					
	0.0002						
	1988	1988					
Age_Single~s	-0.3247*	0.1021*	1.0000				
	0.0000	0.0000					
	1988	1988	1988				
Sex	-0.0817*	0.0022	0.0110	1.0000			
	0.0003	0.9236	0.6234				
	1988	1988	1988	1988			
Race	0.0951*	0.1554*	0.2696*	-0.0485*	1.0000		
	0.0000	0.0000	0.0000	0.0308			
	1988	1988	1988	1988	1988		
Marital_Stat	-0.1768*	0.0734*	0.5846*	0.1296*	0.2002*	1.0000	
	0.0000	0.0011	0.0000	0.0000	0.0000		
	1988	1988	1988	1988	1988	1988	
Education	0.2054*	-0.0107	-0.2125*	-0.1173*	0.2675*	-0.1097*	1.0000
	0.0000	0.6329	0.0000	0.0000	0.0000	0.0000	
	1988	1988	1988	1988	1988	1988	1988
Employment~s	-0.1320*	-0.0261	-0.0471*	0.1755*	-0.1625*	-0.0332	-0.2328*
	0.0000	0.2454	0.0356	0.0000	0.0000	0.1386	0.0000
	1988	1988	1988	1988	1988	1988	1988
HWealth_Stat	-0.2967*	-0.0915*	-0.0265	0.0407	-0.3214*	-0.0595*	-0.3252*
	0.0000	0.0000	0.2378	0.0699	0.0000	0.0080	0.0000
	1988	1988	1988	1988	1988	1988	1988
Religion	0.0175	-0.0158	-0.1164*	-0.1427*	-0.1183*	-0.1159*	-0.0694*
	0.4364	0.4810	0.0000	0.0000	0.0000	0.0000	0.0020
	1988	1988	1988	1988	1988	1988	1988
Trade_Union	-0.0371	-0.0081	-0.0496*	0.0930*	-0.0577*	-0.0517*	-0.2093*
	0.0979	0.7198	0.0271	0.0000	0.0101	0.0212	0.0000
	1988	1988	1988	1988	1988	1988	1988
Safety_Fee~s	-0.0900*	-0.1756*	-0.0304	0.1039*	-0.0740*	0.0115	0.0003
	0.0001	0.0000	0.1750	0.0000	0.0010	0.6084	0.9889
	1988	1988	1988	1988	1988	1988	1988
Residence	-0.1007*	-0.0261	-0.0799*	0.0168	-0.3359*	-0.0590*	-0.2190*
	0.0000	0.2439	0.0004	0.4547	0.0000	0.0085	0.0000
	1988	1988	1988	1988	1988	1988	1988
Years_inNe~d	-0.1953*	0.0040	0.4228*	0.0083	0.0339	0.2138*	-0.1573*
	0.0000	0.8572	0.0000	0.7099	0.1303	0.0000	0.0000
	1988	1988	1988	1988	1988	1988	1988

	Employ~s	HWealt~t	Religion	Trade_~n	Safety~s	Reside~e	Years_~d
Employment~s	1.0000						
	1988						
HWealth_Stat	0.1940*	1.0000					
	0.0000						
	1988	1988					
Religion	-0.0026	0.0964*	1.0000				
	0.9078	0.0000					
	1988	1988	1988				
Trade_Union	0.3522*	0.1552*	0.0370	1.0000			
	0.0000	0.0000	0.0994				
	1988	1988	1988	1988			
Safety_Fee~s	0.0746*	0.0617*	-0.0372	0.0107	1.0000		
	0.0009	0.0059	0.0969	0.6335			
	1988	1988	1988	1988	1988		
Residence	0.1477*	0.2957*	0.0502*	0.1019*	-0.0570*	1.0000	
	0.0000	0.0000	0.0253	0.0000	0.0110		
	1988	1988	1988	1988	1988	1988	
Years_inNe~d	0.0835*	0.0294	-0.0453*	0.0388	-0.0204	0.0809*	1.0000
	0.0002	0.1903	0.0434	0.0836	0.3624	0.0003	
	1988	1988	1988	1988	1988	1988	1988