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A cross-sectional and spatial analysis of the prevalence of multimorbidity and its association with socioeconomic disadvantage in South Africa: A comparison between 2008 and 2012

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ABSTRACT

This study utilised data from the National Income Dynamics Study, a longitudinal study with a sample of approximately 28 000 people, to investigate the cross-sectional and spatial distribution of multimorbidity and the association with socioeconomic disadvantage in South Africa for 2008 and 2012. Multimorbidity increased in prevalence from 2.73% to 2.84% in adults between 2008 and 2012 and was associated with age, socioeconomic deprivation, obesity and urban areas. Hypertension was found frequently coexisting with diabetes. Spatial analysis showed clusters (hot spots) of higher multimorbidity prevalence in parts of KwaZulu-Natal and the Eastern Cape, which compared with the socioeconomic disadvantage spatial pattern. Although these results were limited to a district level analysis, this study has provided a platform for future local level research and has provided insight into the socioeconomic determinants of disease multimorbidity within a developing country.

1. Introduction

South Africa is one of the most developed and urbanised sub-Saharan African countries with approximately two thirds of its national population inhabiting urban areas (McGranahan and Martine, 2012). South Africa provides a remarkable backdrop for health geography research. The notorious Apartheid legacy of South Africa, which divided the population along racial lines and deprived the majority of South Africans of basic human rights, subsequently resulted in many social and economic injustices. The removal of the Apartheid laws in 1994 resulted in high levels of urbanisation and a rise in unemployment rates, which further entrenched inequality (Chopra and Sanders, 2004). Today, many disparities currently exist in South Africa, not only along socio-economic lines but also spatially, such as between cities and the traditional homelands, and between districts and provinces (McIntyre et al., 2002; Noble and Wright, 2013).

Omran's epidemiological transition model (Omran, 1971) provides a useful theoretical framework for national health research and suggests that a country's health and disease pattern will gradually progress through a series of stages, in response to various social, economic and demographic factors. This model suggests that countries will evolve through an era dominated by infectious diseases before experiencing an era of chronic non-communicable diseases (NCDs), mostly caused by the adoption of unhealthy, sedentary lifestyles that include reduced exercise, poor nutritional intake, alcohol consumption and smoking tobacco products (Chopra and Sanders, 2004; Omran, 1971). However, some countries and sub-national populations do not experience a distinct progression through these stages and may in fact experience a blurry transition where infectious and non-communicable diseases exist together within a population and the poor may be disproportionately affected by disease. Thus, Frenk et al. (1989) presented the protracted-polarised model as a modification to the epidemiological transition model in order to represent this indistinct transition in epidemiology that is particularly relevant to developing countries of the global South.

The history of social, economic and demographic shifts in South Africa have all contributed towards a transition in health that

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supports the protracted-polarised model of epidemiological transition (Chopra and Sanders, 2004). South Africa is characterised by a quadruple burden of disease, which includes the human immunodeficiency virus (HIV) and tuberculosis (TB); NCDs; perinatal and maternal; and injury-related disorders (Bradshaw et al., 2003). In addition, the national population is increasingly aging and the widespread use of antiretroviral therapy is resulting in an aging population of HIV-infected persons and an accompanying rise in coexisting chronic health conditions in individuals (Tseng et al., 2014).

Multimorbidity, which is defined as the presence of two or more chronic health conditions existing simultaneously in an individual, brings about a decline in quality of life for patients as well as increased expenses and complications for treatment plans and medical care (Barnett et al., 2012; Marengoni et al., 2011). Multimorbidity has usually been associated with age, particularly with adults older than 65 years and is increasingly common in patients due to factors such as aging populations and a rise in age-related chronic health conditions (Uijen and van de Lisdonk, 2008; Van den Akker et al., 1998). However, recently it has been increasingly reported in people younger than 65 years, especially in adults who are socioeconomically deprived (Alaba and Chola, 2013; Barnett et al., 2012; Uijen and van de Lisdonk, 2008).

In South Africa, multimorbidity is alleged to be present in the population, however the prevalence and social determinants of multimorbidity remain under-researched (Alaba and Chola, 2013). Multimorbidity has been reported to be higher among females and in approximately 4% of the adult population; however it was suggested that this prevalence was likely underestimated (Alaba and Chola, 2013). High blood pressure is a common contributor to multimorbidity in South Africa (Alaba and Chola, 2013; Ataguba, 2013) and is frequently found to coexist with diabetes (Oni et al., 2015). Data from the 1998 South African Demographic and Health Survey (DHS), as reported in the Poverty and Chronic Diseases Report, suggest that areas associated with low socioeconomic status experience a significant burden of premature mortality that can be linked to various diseases (Bradshaw and Steyn, 2001).

The presence of socioeconomic factors such as crowded living conditions, poor nutrition, limited financial resources, and poor housing and sanitation, is likely to increase the risk of TB infection and exacerbate the transmission of the disease in communities, particularly where there is a high HIV prevalence (Creswell et al., 2011; Lönnroth et al., 2010; Rasanathan et al., 2011). Yet its influence on multimorbidity remains largely unknown. HIV was estimated to be prevalent in 12.2% of the population in 2012, according to the South African National HIV Prevalence, Incidence and Behaviour Survey (Shisana et al., 2014) and is the strongest known driver of the TB epidemic in South Africa, which was one of six countries with the highest number of new TB cases in 2013 (410,000–520,000 incident cases) (Creswell et al., 2011; World Health Organization, 2014). In addition, poorer socioeconomic groups have been associated with a higher prevalence of NCD risk factors, including alcohol consumption, increased salt consumption, and obesity which affects 40% of South African adult females (Bradshaw and Steyn, 2001).

Although hypertension has been associated with factors such as alcohol consumption, smoking, high body mass index and inadequate exercise, research has suggested that the degree of association between socioeconomic status and hypertension varies between males and females (Cois and Ehrlich, 2014). Data on hypertension prevalence for the country are available from the 1998 South African DHS, which show a prevalence of 21% for both males and females using the 140/90 mmHg threshold (Steyn, 2006). Cois and Ehrlich (2014) suggest this may have increased by approximately 22% and 28% in males and females, respectively, between 1998 and 2008.

Regarding diabetes, 6.5% of South African adults (20–79 years) were estimated to have diabetes in 2011 (Whiting et al., 2011). South Africa has very few prevalence statistics for diabetes, yet studies have shown an association with age and have revealed prevalence disparities between ethnic groups, with the Asian/Indian population at higher risk of developing type 2 diabetes due to a higher risk of developing insulin resistance compared to other ethnic groups (Bajaj and Banerji, 2004; Bradshaw et al., 2003). It is a common perception that diabetes is associated with urbanisation due to exposure to more sedentary lifestyles (Green et al., 2003; Shaw et al., 2010).

In South Africa, there is limited research investigating the coexistence of many of these diseases, as well as the association between multimorbidity and socioeconomic disadvantage (Ataguba, 2013). Therefore, this study aims to contribute to efforts in addressing the paucity of information on multimorbidity in South Africa by studying the epidemiology of selected chronic infectious and non-communicable diseases and multimorbidity, and the association with socioeconomic disadvantage in South Africa.

2. Materials and methods

This study utilised data from wave 1 (Southern Africa Labour and Development Research Unit, 2014a) and wave 3 (Southern Africa Labour and Development Research Unit, 2014b) of the National Income Dynamics Study (NIDS) to estimate the prevalence of HIV, TB and NCD multimorbidity for the adult sub-sample, focusing on hypertension and diabetes, the most prevalent NCDs in this setting, and to determine the changes in reported HIV, TB and NCD multimorbidity over time. In addition, this study compared the cross-sectional and spatial association between socioeconomic disadvantage and multimorbidity in respondents who completed wave 1 and wave 3 of the NIDS. Wave 2 was omitted from this study as response rates for key health-related questions determining if the respondent had diabetes or hypertension were considerably lower in wave 2. Further investigation of wave 2 data is necessary before its inclusion in research.

The NIDS is a panel study conducted by the Southern Africa Labour and Development Research unit (SALDRU) that seeks to provide representative socioeconomic, behavioural and anthropometric data for South Africa. This longitudinal study began in 2008 with a nationally representative sample of over 28,000 individuals, including adults and children from 7300 households (Leibbrandt et al., 2009). There have been three waves of data collection, in 2008, 2010 and 2012. The 2008 NIDS base wave used a stratified, two-stage cluster sample design. Each NIDS wave is regarded as an independent cross-section in order to maintain representation of the national population.

The study population under analysis was the adult sub-sample from wave 1 (2008) and wave 3 (2012) of the NIDS. It is important to note that the NIDS study primarily relies on self-reporting of health conditions, however blood pressure, height and weight measurements are taken as part of the survey.

2.1. Measures

The primary outcome variables in this study were multimorbidity and hypertension, which was identified as the most prevalent of the selected chronic diseases and most likely to contribute to multimorbidity. Respondents were classified as hypertensive if they acknowledged having ever been diagnosed with high blood pressure by a health care professional (self-reported measure) or if respondents had an average systolic blood pressure reading >140 mmHg and/or an average diastolic pressure reading