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Income inequality widens the existing income-related disparity in depression risk in post-apartheid South Africa: Evidence from a nationally representative panel study

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ABSTRACT

Aim: Income inequality (II) and poverty are major challenges in South Africa (SA) yet little is known about their interaction on population mental health. We explored relationships between district II, household income (HHI) and depressive symptoms in national panel data.
Method: We used 3 waves (2008, 2010, 2012) of the SA National Income Dynamics Study (n=25936) in adjusted mixed effects logistic regression to assess if the relationship between HHI and depressive symptoms is dependent on level of II. Depressive symptoms were assessed with Centre for Epidemiologic Studies Depression scale, and District inequality ratios (P10P90) derived from HHI distributions in 53 districts.
Results: Lower HHI and increasing II were associated with depressive symptoms. The interaction term between HHI and II on depressive symptoms was significant ($\beta=0.01$, 95% CI: < 0.01-0.01); with increasing II and decreasing HHI, depression risk increased.
Conclusion: II widens income-related disparities in depression risk in SA, with policy implications for understanding socioeconomic determinants of mental health and informing global efforts to reduce disparities in high poverty and inequality contexts.

1. Introduction

The Millennium Development Goals (MDGs), a set of development targets agreed to by member countries of the United Nations to achieve by 2015, have had mixed success with most countries failing to achieve many of the goals; an important criticism is that "they lacked a vision of equitable development" (Doyle and Stiglitz, 2014). Growing recognition of the pernicious effects of income inequality on economic growth, social cohesion and health outcomes has resulted in the inclusion of inequality reduction in the new Sustainable Development Goals (SDGs), an expanded set of international targets to strive for by 2030. Countries will be monitored over the next 15 years as they attempt to narrow the gap between those with extreme wealth and those in dire poverty. For many low- and middle-income countries (LMICs) this will be a considerable challenge as they work to build healthy and stable economies and sustainable social and political structures.

It has long been recognized that social determinants such as socioeconomic status (SES) have a direct relationship with health outcomes (Marmot et al., 1991; Mackenbach et al., 1997) including mental disorders (Weich and Lewis, 1998; Lorant et al., 2003; Lund et al., 2010; Richardson et al., 2015). Increasing absolute material wealth strongly predicts better mental health outcomes and life expectancy within countries, but does not explain differences in these outcomes between high-income countries (Wilkinson and Pickett, 2014). Despite rising national wealth (increasing GDP per capita), most high-income countries have not seen corresponding decreases in health (including mental health) inequalities (Coburn, 2000).

These observations have led to a more recent focus on the relative distribution of income or wealth within and across societies ('income inequality') and its relationship with health outcomes. The first publications demonstrating positive associations between income in-

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equality and mortality rates, both in the UK (Wilkinson, 1992) and the USA (Kaplan et al., 1996; Kennedy et al., 1996), were followed and mostly supported by several subsequent publications reporting similar associations between income inequality and various adverse health outcomes (Kawachi et al., 2002; Subramanian and Kawachi, 2004; Kondo et al., 2009). In a recent review, Pickett and Wilkinson (2015) argue that recent research using multilevel and longitudinal methodologies has provided sufficiently strong evidence to support a causal relationship between income inequality and poorer health.

A modest literature (mostly from high-income countries) supports inequality effects on population mental health, including common mental disorders such as depression and anxiety (Weich et al., 2001; Ahern and Galea, 2006; Pickett et al., 2006; Messias et al., 2011; Chiavegatto Filho et al., 2013; Pabayo et al., 2014) and psychotic disorders (Boydell et al., 2004; Burns et al., 2008, 2014). Notably, a number of studies have reported no association (Sturm and Gresenz, 2002; Henderson et al., 2004; Rai et al., 2013; Fernández-Niño et al., 2014), including a very recent study in South Africa (Adjaye-Gbewonyo et al., 2016).

A number of questions regarding the relationship of inequality to mental health remain controversial and unanswered. Firstly, most evidence to date comes from high-income country populations where, on average, levels of poverty and inequality are lower. It is difficult to extrapolate from this data to contexts characterized by extremes of material deprivation and inequitable distributions of wealth. There has been very little research into the inequality-health relationship (including the inequality-mental health relationship) within countries that lie at the upper extreme of income inequality. Specifically, it is not clear whether a mental health gradient exists in relation to a range of inequality, in circumstances of extreme inequality. South Africa, a country rated by the World Bank as having the highest Gini index of income inequality (0.65) in the world (World Bank, 2015), provides an opportunity to test this question. Twenty years after political liberation, South Africa is characterized by persistent high levels of unemployment, widespread poverty, high crime rates, a struggling economy, and extreme income inequality. This has led some commentators to argue that post-apartheid South Africa obtained political freedom at the cost of social and economic freedom (Klein, 2007).

Secondly, a key question, posed by Subramanian and Kawachi (2006) is: "Whose health is affected by income inequality?" These authors concluded: "everyone stands to lose from living in a more unequal state." However, some studies have found that the negative health effects of income inequality are confined to certain populations including women (Pabayo et al., 2014) and those in both the lowest (Boydell et al., 2004) and highest socioeconomic strata (Choi et al., 2015). Within LMICs, where both poverty and inequality too often exist at extreme levels, it is important to clarify if and how inequality impacts the relationship between socioeconomic status and mental health. Specifically, in contexts of significant poverty, does inequality further impact the disparity in depression risk that is due to poverty? And does inequality impact those in poverty more than those of higher socioeconomic status? Or, as suggested in a recent study (Adjaye-Gbewonyo et al., 2016), income inequality may not matter in "low- or middle- income countries with high levels of poverty, where the effects of material poverty and absolute income may be more significant." Showing that inequality has unequal effects on those of differing socioeconomic status would have important social and economic policy and human rights implications.

With these unresolved questions and issues in mind, we aimed to address the following questions through analyzing longitudinal data from a nationally representative household panel survey in South Africa:

1. What is the relationship between household income and depressive symptoms within a context characterized by high levels of poverty?
2. What is the relationship between income inequality and depressive symptoms within a context characterized by very high income inequality?
3. Is effect of household income on depressive symptoms dependent on varying levels of income inequality?

2. Methods

2.1. Data source

The South African National Income Dynamics Study (SA-NIDS) is a nationally representative panel survey of households in South Africa (Leibbrandt et al., 2009). It is conducted by the Southern Africa Labour and Development Research Unit, University of Cape Town. At the time of this report, data from the first three waves of SA-NIDS was available – Wave 1 in 2008, Wave 2 in 2010 and Wave 3 in 2012. SA-NIDS utilized a stratified two-stage cluster sample design to randomly select 400 of Statistics South Africa's 3000 primary sampling units (PSUs) for inclusion in the surveys. In the most recent survey (Wave 3), approximately 18,710 adults aged 15 years or older from approximately 8040 households were interviewed with an adult questionnaire, while the oldest female resident (or another knowledgeable adult) was interviewed with a household questionnaire. In the current study we utilized data from the adult and household questionnaires from all 3 waves of the SA-NIDS. The SA-NIDS was approved by the Ethics Committee of the Commerce Faculty, University of Cape Town, and the de-identified datasets are publicly available. For the current analysis we obtained approval from the University of KwaZulu-Natal Biomedical Research Ethics Committee.

2.2. Measures

The main outcome of our analysis was depression symptomatology, which was assessed by the 10-item abridged version of the Centre for Epidemiological Studies Depression Scale (CES-D). This version of the CES-D correlates well with the original 20-item scale (Shrout and Yager, 1989), which has been used in several South African studies (Hamad et al., 2008; Myer et al., 2008). The CES-D is a self-report instrument that is based on the experience of depressive symptoms over the last week. Each of the 10 items is scored on a Likert scale (0–3) with the composite score for the scale ranging from 0 to 30 (Cronbach's alpha =0.72), and higher scores indicating more severe depressive symptoms. We dichotomized the total score using the cut-off value of ≥10 (Andresen et al., 1994).

Demographic data were drawn from the NIDS-SA adult interviews, while household income was derived from the household questionnaire of NIDS-SA. The log-transformed income was utilized for this study.

We calculated the 90/10 income inequality (P90/P10) ratio as a measure of income inequality at the level of District Municipality. The P90/P10 ratio is the mean income of those at the 90th percentile of income divided by the mean income of those at the 10th percentile of income and is sensitive to inequalities in the top and bottom of the spectrum of income distribution in a population. It is the most commonly used measure of income inequality in the US labour economics literature (Burkhauser et al., 2007) and is widely used within the European Commission literature to highlight health inequalities across Member States (Social Situation Report, 2009; Spinakis et al., 2011). While the Gini coefficient is most commonly used in health and inequality research, its main weaknesses are that it cannot differentiate between kinds of inequalities and income distributions and is most sensitive to inequalities in the middle part of the income spectrum (Ellison, 2002; De Maio, 2007). Importantly, high correlation has been shown between various measures of income inequality including the Gini coefficient and the P10P90 ratio (Kawachi and Kennedy, 1997). In the South African context, a country with extreme levels of income inequality (related in the main to marked inequalities in the top and bottom of the spectrum (Leibbrandt et al., 2007)), we