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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.

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Declaration of interests

We declare no competing interests.

Keywords

income inequality; poverty; depressive symptoms; South Africa

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 & 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 & Lewis, 1998; Lorant et al., 2003; Author 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 & 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 inequality 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 & 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 & 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; Author et al, 2008; Author et al, 2014). Notably, a number of studies have reported no association (Sturm & 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:

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

Methods

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 3,000 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.

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 & 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 0–30 (Cronbach's $\alpha = .72$), and higher scores indicating more severe depressive symptoms. We dichotomized the total score using the cut-off value of 10 (Andresen, 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 & 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 therefore selected the P10/P90 ratio as the inequality metric in the current study.

There were 53 District Municipalities in South Africa prior to the 2011 census. Since NIDS-SA was representative at the national level only (and not at the District Municipality level), we calculated the P10P90 ratio for the 53 District Municipalities from the per capita household income data of the Income and Expenditure Survey (IES) 2005/06 (Statistics South Africa, 2008). The IES included 24 000 households throughout SA and was representative at the district level. P10P90 ratios were calculated using the Stata programme and could be linked to participants within the NIDS-SA dataset as district of residence was captured in the adult questionnaires.

Statistical analysis

Following descriptive analyses of baseline (Wave 1) demographic characteristics, a mixed effects logistic regression model was fitted to assess the longitudinal relationships between district-level income inequality, household income and depressive symptoms across three waves [and not pooled cross sectional analysis method]. The model included an interaction term between the two main effects (i.e. household income and income equality) in order to assess if the effect of household income on depressive symptoms is dependent on varying levels of income inequality. The mixed effects regression model was adjusted for other demographic variables (age, gender, educational attainment, employment status, race/ethnicity, marital status, and assessment year to control for time trend). Given the complexity of interpreting interactions in logistic regressions, the predicted probability of depression risk by varying levels of inequality and household income was obtained. Since the study involves a complex survey, regression analyses were also adjusted by post-stratification weight from respective waves. Post-stratification weights (from Waves 1–3) were based on the age-sex-race distribution produced by Statistics South Africa from mid-year population estimates (2008, 2010 and 2012) when the study was implemented. STATA 14 was used for the analyses.

Results

Baseline demographics and clinical characteristics are shown in Table 1. The prevalence of depressive symptoms (CESD 10) in this population (n=15 505) was 38.9% (n=5 275).

Household income and income inequality interaction on depressive symptoms

The interaction between household income and income inequality (P10P90 ratio) on depressive symptoms was significant ($\beta=0.01$, 95% CI: <0.01–0.01) (see Table 2). Specifically, with increasing inequality and decreasing household income, the risk of depressive symptoms increased. A positive relationship was also found between increasing income inequality (P10P90 ratio) and depression risk ($\beta=0.04$, 95% CI: 0.01–0.07). The findings on interaction between household income and income inequality are illustrated in

Figure 1 where there is a differential effect of increasing district level P10P90 ratio on risk of depression according to household income category. The graph shows that those in the lower household income categories have increasing risk for depression with increasing P10P90 ratios. Our analyses indicated a significant difference in the predicted depression risk between low (probability=39.08%, 95% CI: 33.42–44.75%) and high income inequality exposure (probability=54.51%, 95% CI: 45.70–63.33%) among the lowest household income group based on lack of overlap in the confidence interval. Similarly, among the second lowest household income group, we found a significant difference in the predicted depression risk between low (probability=32.98%, 95% CI: 30.02–35.95%) and high income inequality exposure (probability=41.68%, 95% CI: 36.43–46.94%); however this was not found in the rest of the household income groups (i.e. middle and higher household income groups). We also tested the interaction of gender and income inequality but no differences were observed by sex.

Sociodemographic risk factors for depressive symptoms

Adjusted mixed effects logistic regression (Table 2) showed a number of other factors associated with depressive symptoms in this population. Older age was associated with increased odds of depression risk in a dose-dependent manner with those 35 years and older having higher odds of depression risk compared with individuals aged 15 to 19 years ($\beta=0.87$, 95% CI:0.75–0.99). Female gender was associated with increased odds of depression risk compared with males ($\beta=0.13$, 95% CI:0.06–0.20) while, compared with individuals either married or living with a partner, those never married ($\beta=0.26$, 95% CI: 0.17–0.35) and those either widowed, divorced or separated ($\beta=0.44$, 95% CI:0.32–0.56) had a higher odds of depression risk respectively. Ethnic disparities in depression risk were also apparent, with Black African individuals having higher odds of depression risk compared with Whites ($\beta=0.78$, 95% CI:0.53–1.04). Those with increased educational attainment, particularly those having tertiary education ($\beta=-0.37$, 95% CI:–0.50 – –0.24), had lower odds of depression risk (compared to those who did not complete high school). Finally, being employed was associated with reduced odds of depression risk ($\beta=-0.15$, 95% CI:–0.23 – –0.06) compared with unemployed people.

Discussion

In this analysis of longitudinal panel data from the 3 waves of the NIDS-SA survey, we have made several key findings that we believe move the field forwards. The first is that we have shown an inverse relationship between household income (an objective measure of socioeconomic status) and depressive symptoms in South Africa, a LMIC country characterized by extreme material deprivation and poverty; a finding that has been previously demonstrated in high-income country contexts (Weich & Lewis, 1998; Lorant et al., 2003; Richardson et al., 2015). This provides further support for evidence showing that poverty is a major risk factor for mental health disorders in LMICs (Patel & Kleinman, 2003; Author et al., 2010; Author et al., 2011; Author, 2014).

Secondly, our results replicate previous evidence that increasing income inequality is associated with increased risk of depression (Weich et al., 2001; Ahern & Galea, 2006;

Pickett et al., 2006; Messias et al., 2011; Chiavegatto Filho et al., 2013; Pabayo et al, 2014). The significance of the present result lies firstly in the fact that this study was located within a middle-income country (and most evidence to date on this relationship has emanated from high-income countries); and secondly, in the fact that this association has been shown within a country marked by extreme income inequality. In comparing inequality ratios across the 53 district areas we find a range of levels of inequality – but significantly, the lowest ratios in this range are actually very high inequality ratios when compared with most other countries. This means that our analysis of inequality between Municipalities in South Africa is comparing the effects of relative levels of high to extremely high inequality between regions on mental health and not just the effects of inequality per se. Thus our finding of an association between increasing income inequality and depressive symptoms within this particular context highlights the importance of social comparisons in understanding the mechanisms linking inequality to poor mental health outcomes (Chiavegatto Filho et al., 2013).

Thirdly (and perhaps most importantly) we found a significant interaction between decreasing household income (HHI) and increasing income inequality on depression outcome. The interaction reveals that for individuals living in low HHI households, the increased risk for depressive symptoms varies according to the levels of inequality within the district in which one resides. In other words, increasing district-level income inequality widens the existing disparity in depression risk that is due to low HHI. In this way, income inequality could be said to enhance the negative mental health effects of material deprivation and poverty. Putting it simply, if one is poor, one is dealing with the difficulties of poverty and the accompanied higher risk for depression. But if one is poor and living in a region where the differences in material conditions are very significant and apparent, then social comparisons are likely to be distressing as one experiences feelings of failure, poor self-worth and shame. These individuals face not only the risks associated with poverty itself, but also the additional stresses related to social comparisons.

This finding has profound implications for understanding the social and economic determinants of poor mental health in SA, which must be considered against the particular socioeconomic circumstances that have evolved over the last 20 years in post-apartheid South Africa. Already a neoliberal, capitalist economy, the opening up of trade barriers in South Africa after 1994 (after economic sanctions were lifted) led to rapid globalization and rising inequality between 1994 and 2008, especially in urban regions (Leibbrandt et al, 2007). This coincided with widespread expectations that the political emancipation of the early 1990s would bring relief from poverty, employment and a better life for the millions living in conditions of severe material deprivation. Rising inequality during this period reflected the rise of a minority into conditions of considerable wealth and privilege, while rapid globalization within post-apartheid South Africa gave rise to the perception that material accumulation indicated rising social status. Within such an environment in transition, the major emphasis placed on social and economic standing brought with it pressures and expectations to achieve. Not surprisingly, these pressures and expectations would be felt most by those living at the bottom of the socioeconomic ladder; especially within high inequality region, where the differences between wealth and poverty are most stark.

In South Africa then, rampant inequality is a significant barrier to social and economic empowerment, with the hopes and expectations of many people seeking to improve their socioeconomic status frustrated by structural factors such as high unemployment and continuing poverty. With poor future economic prospects, a sense of disillusionment and disempowerment results – some authors have called this ‘social defeat’ (Chiavegatto Filho et al., 2013) – and for some this is a path to depression. For this reason we strongly disagree with Adjaye-Gbewonyo et al (2016) who, in trying to explain their negative result on income inequality and depression in the NIDS cohort, suggest that “compared to populations in high-income countries, South Africans are more tolerant of high levels of income inequality because of their hopes and expectations for a better future in a post-apartheid setting.” On the contrary, we argue that the failure of these hopes and expectations, made starkly evident by gross and pervasive economic inequality, has rendered citizens of that country (and in particular those living in poverty) vulnerable to mental health problems such as depression.

Importantly, income inequality may also lead to depression via another pathway or mechanism that has an equally or even greater destructive impact on social and economic development in society. There is evidence that income inequality has an erosive effect on social capital within communities, which leads to social fragmentation and increased vulnerability to psychosocial stressors (Wilkinson, 1996; Mansyur et al. 2008). Several authors have demonstrated an inverse relationship between income inequality and social capital (Kawachi & Kennedy, 1997); while lower neighbourhood-level social capital has been correlated with depressive symptoms at the population level within LMIC settings (Tomita & Burns, 2013).

Finally, while absolute income and in particular poverty are associated with mental health outcomes, we do not believe that in the South African context the association between income inequality and depression is merely explained by the absolute income effect (e.g. through lack of access to mental health services). In fact the South African Stress and Health Study (Williams et al., 2008) showed that there is universally low access to mental health services across the country and across socioeconomic groups, stating “Unlike in most other WMH countries, the receipt of health treatment for mental disorders was not strongly patterned by sociodemographic factors suggesting that there is considerable uniformity in the barriers to obtaining treatment for mental disorders” (Williams et al., 2008). Absolute income is thus unlikely to impact on depression prevalence through reducing service access (there may be some effect for the top 15% of the income distribution who have access to private mental health care, but even then the coverage is low due to poor mental health literacy and awareness). For the remaining 85% of the population, the problem with public sector mental health services is not that they are not affordable (in fact public health services are free), but that they do not exist – certainly as far as treatment of depression in primary care is concerned.

Thus if we address the possible mechanisms underlying our finding that income inequality is differentially associated with risk for depressive symptoms across household income groups, we might hypothesize that in high income inequality areas, the negative effects of social comparisons are likely to be most distressing for those individuals who are most economically deprived. While the high income inequality context may have a negative

health impact on everyone residing within an area (due to its damaging effects on social capital and tendency to increase social fragmentation), these negative effects are compounded among low household income individuals who also experience the negative effects of distressing social comparisons, including feelings of failure, disempowerment, poor self-worth, and 'social defeat'. One might conclude then that absolute income can to some extent buffer the negative mental health effects of income inequality.

Individual level sociodemographic factors associated with increased risk for depression in the logistic regression include female gender, increasing age, Black African ethnicity, never married or either widowed, divorced or separated, lower educational attainment, and unemployed status. These findings have been reported previously from the NIDS study (Author et al., 2015) and are supported by an extensive literature (including from South Africa) as well recognized risk factors for depression in the general population (Coryell et al., 1992; Blazer et al., 1994; Herman et al., 2009).

The main strength of this study is its large and nationally representative sample size and longitudinal nature of the data, which allow us to assess how income inequality can influence the relationships between measures of wealth/income, inequality, and the depression outcome. This study also provides much needed evidence from a LMIC context and demonstrates that, even within a context characterized by extreme levels of poverty and inequality, the previously reported damaging effects of income inequality on population mental health are evident. We argue that this supports the role of social comparisons as a mechanism underlying this relationship since the entire spectrum of inequality present in our study is located at the upper end of a broader global spectrum of income inequality. Finally, our finding that there is a differential negative effect of income inequality on mental health that is dependent on level of household income, counters the widely supported notion that income inequality is a risk factor for individuals irrespective of their income (Kawachi et al., 2002).

The main limitation is the inclusion of only one measure of economic status – household income, which is not necessarily the best indicator of material worth, as it does not include assets and informal sources of income (Author, 2014). A further limitation concerns our choice of income inequality measure. All income inequality metrics have advantages and limitations (Kawachi & Kennedy, 1997; Ellison, 2002; De Maio, 2007; Spinakis et al., 2011) and our choice of the P10P90 ratio in this study may be open to criticism, especially since the Gini coefficient is most commonly used in the health and inequality literature and is often favoured because it incorporates data from throughout the income spectrum. Indeed, in their recent study of inequality and depression in the NIDS cohort, Adjaye-Gbewonyo et al (2016) utilized the Gini coefficient. We have argued however that the Gini's shortcomings of not being able to show where in the distribution the inequality occurs and its tendency to be oversensitive to changes in the middle of the distribution and insensitive to changes at the top and bottom make it less suitable for use in the South African context. In their similar study, Adjaye-Gbewonyo et al (2016) did not find an association between district-level Gini and depressive symptoms and, in trying to explain their negative finding, they suggest that "It may be that in the states or countries in which associations between income inequality and health have been observed, Gini coefficients correspond to particular structures of the

income distribution which differ from those in South Africa.” The Chilean economist Gabriel Palma demonstrated that middle class incomes invariably represent about half of gross national income while the other half is split between the richest 10% and poorest 40% (Palma, 2011). Importantly the share of those two groups varies considerably across countries and regions; thus two very different income distributions can have the same Gini coefficient. In South Africa, with marked inequalities at either end of the income spectrum, the P10P90 (which correlates well with the Gini coefficient (Kawachi & Kennedy, 1997)) is arguably a more suitable measure of inequality.

Final limitations of our study include: that our findings are not generalizable to other countries, especially those with much lower levels of poverty and income inequality; and that, as in other studies using area-level data, we need to consider the geographical scale at which we measured income inequality. While evidence supports inequality effects at both large and small geographical scale (Wilkinson & Pickett, 2007; Messias et al., 2011; Chiavegatto Filho et al., 2013) we cannot be sure that our use of the district in this study was the appropriate level. This factor suggests caution against generalizing our findings to other countries.

These limitations and our findings point to potentially fruitful areas of research in future: firstly nationally representative studies are needed from other low and middle-income countries that examine the effects of poverty and income inequality on depression; secondly we need to evaluate upstream interventions that target either poverty or inequality and their effects on depression at the population level; and thirdly we need longitudinal data to further develop hypotheses regarding potential causal mechanisms of the relationship between poverty, inequality and depression.

In conclusion, our finding that income inequality widens the existing income-related disparity in depression risk, answers to some extent the question as to “whether absolute income is of more importance for health in LMICs compared to relative income” (Adjaye-Gbewonyo et al, 2016) – our results suggest that both absolute and relative income matter for mental health in this context. Our finding also has major policy implications for global and country efforts to reduce health disparities, especially within LMIC contexts undergoing rapid economic development. Alleviation of poverty is quite rightly a key priority and Sustainable Development Goal (SDG); but the noxious effects of inequality, not just on the economic growth and development but also on the mental health and social cohesion of nations, should not be underestimated. The inclusion of inequality reduction as a part of the SDGs is welcomed and hopefully reflects a serious commitment by global and national leaders to improving the wellbeing of people throughout the world.

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Highlights

- Low household income is a risk factor for depression in South Africa (SA)
- Income inequality is a risk factor for depression in SA, a country with extreme levels of inequality
- Income inequality widens the existing income-related disparity in depression risk in SA

Figure 1.
Relationship between P90/P10 and depression risk by household income groups

Table 1

Baseline demographic and clinical characteristics

Variables	n	%
<u>Age categories:</u>		
15–19	2 665	15,1%
20–24	2 061	12,9%
25–29	1 572	12,7%
30–34	1 368	11,8%
35+	7 886	47,6%
<u>Gender:</u>		
Male	6 263	44,2%
Female	9 307	55,8%
<u>Race/Ethnicity:</u>		
African	12 218	79,0%
Coloured	2 217	8,2%
Asian/Indian	224	2,4%
White	912	10,5%
<u>Marital status:</u>		
Married/living with partner	5 773	40,7%
Widow/divorced/separated	1 806	10,3%
Never Married	7 932	49,0%
<u>Educational attainment:</u>		
Less than high school	2 128	9,2%
Completed high school	9 954	60,9%
Beyond high school	3 489	30,0%
<u>Employment status:</u>		
Not employed	9 407	56,0%
Employed	6 001	44,0%
Household income:	15 571	Median = R2698.57
<u>Depression risk:</u>		
CESD<10	10 230	61,1%
CESD ≥ 10	5 275	38,9%

% adjusted for post-stratification weight.

Table 2

Relationship between income, income equality and depression

Variables	Reference category	Coefficient	Robust SE	Z	p	95% CI
Household income:		0.06	0.05	1.39	0.16	-0.03 0.15
P90/P10 ratio:		0.04	0.02	2.45	0.01	0.01 0.07
Interaction (of above):		0.01	0.01	2.35	0.02	<0.01 0.01
Age categories:	[15–19]					
20–24		0.43	0.06	6.97	<0.01	0.31 0.55
25–29		0.65	0.07	9.71	<0.01	0.52 0.78
30–34		0.74	0.07	9.95	<0.01	0.60 0.89
35+		0.87	0.06	14.23	<0.01	0.75 0.99
Educational attainment:	[Did not complete high school]					
Completed high school		-0.09	0.05	-1.74	0.08	-0.19 0.01
Beyond high school		-0.37	0.07	-5.65	<0.01	-0.50 -0.24
Gender:	[Male]					
Female		0.13	0.04	3.75	<0.01	0.06 0.20
Marital status:	[Married or living with partner]					
Widow/Divorced/Separated		0.44	0.06	7.20	<0.01	0.32 0.56
Never Married		0.26	0.05	5.71	<0.01	0.17 0.35
Race/Ethnicity:	[White]					
African		0.78	0.13	5.97	<0.01	0.53 1.04
Coloured		0.41	0.14	2.91	<0.01	0.13 0.69
Asian/Indian		0.23	0.27	0.86	0.39	-0.30 0.76
Employment:	[Not employed]					
Employed		-0.15	0.04	-3.50	<0.01	-0.23 -0.06
Assessment year:	[2008]					
2010		-0.56	0.04	-13.54	<0.01	-0.64 -0.48
2012		-0.41	0.04	-10.43	<0.01	-0.49 -0.34

Reference category in bracket.

* Household income is in negative log household income for the purpose of interpretability of interaction terms. P90/P10 ratio is in % points.