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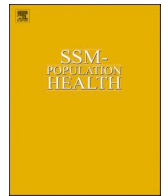Cyprian Mostert

Macroeconomics and health: Understanding the impact of a declining economy on health outcomes of children and young adults in South Africa

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ABSTRACT

Background: The current covid-19 economic crisis continues to weaken economic growth in South Africa. This study was designed to show how a declining economic state affects the mental health conditions, metabolic risk factors, communicable conditions, and non-communicable conditions of adolescent (18-year cohorts) and adult (25-year cohorts) population groups comparatively.

Study design: This was a panel analysis using secondary data issued by Statistic South Africa.

Methods: The author used a Two-stage Least Squared Model (2SLS) to quantify the impact of the declining economy on mental health conditions (depression and traumatic stress), non-communicable conditions (cancer and diabetes), metabolic risk factors (alcohol abuse and hypertension), and communicable conditions (influenza, diarrhea, dry cough) of both adolescent and young adult population groups. Each group comprised a treatment and a control group.

Results: The declining economic state of 2008–2014 worsens the mental health conditions, metabolic risk factors, and non-communicable conditions of adolescent and young adult populations. However, the declining economy reduced cases of communicable conditions. The impact of the declining economy worsens mental health conditions, metabolic risk factors, and non-communicable conditions more in urban settings than in rural regions. Men abuse alcohol more than women during economic decline, triggering worsening mental health conditions, hypertension, and non-communicable conditions, especially in the adult population residing in urban settings.

Conclusions: Economic decline worsen mental health conditions, metabolic risk factors, and non-communicable conditions. The South African government may want to prioritize these conditions as covid-19 economic shocks continue to backslide economic growth.

1. Background

There is an ongoing debate about the intersection between macroeconomic performance and health outcomes. Some authors argue that macroeconomic performance is a crucial determinant of health (Cervini-Plá & Vall-Castelló, 2021). For example, it is documented that cardiovascular diseases decrease when macroeconomic conditions improve (Svensson, 2007). Economic growth increases health expenditure and reduces inequalities. These factors improve cardiovascular diseases (Cohen et al., 2015).

However, other authors disagreed with the view that macroeconomic performance is a determinant of health. For example, according to Ruhm (2015), health outcomes are not related to macroeconomic conditions. However, a recent review article rejected Ruhm's

perspective. According to Hiilamo et al. (2021), macroeconomic performance is directly linked to health outcomes - with economic decline associated with worsening mental health conditions. Substance abuse drives the worsening of mental health during economic decline (Hiilamo et al., 2021).

All these new papers call for more studies to be conducted and explore the contribution of macroeconomic decline on various health outcomes to fully understand the relationship between economic performance and health outcomes (Cervini-Plá & Vall-Castelló, 2021; Hiilamo et al., 2021). As Zhou et al. (2020) argued, such an angle of literature is minimal, especially in developing countries.

So far, Kamanda et al. (2022) have discovered that economic growth yield improvement in health expenditure in Africa. Such expenditure has a positive causality impact on improving health outcomes. However,

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studies have yet to explore how economic decline impact health outcomes in the African continent.

The current study is designed to fill this gap by showing how a declining economic state in South Africa affects mental health conditions, metabolic risk factors, communicable conditions, and non-communicable conditions of adolescents and adults concurrently. The current analysis is the first study to explore the intersection between economic decline and health conditions using African data. Hence, the paper is pushing the streams of this literature with a perspective from one of the developing countries.

1.1. Economic declines in South Africa

The South African economy grew significantly from 2002 to 2007 (See Fig. 1), with unemployment falling from 33.4 percent in 2002 to 26.6 in 2007 (O'Neill, 2021). However, the good economic times were reversed by the 2008 financial crisis, which caused a 42 percent decline in economic growth when estimated from 2008 to 2014. Unemployment rose from 22.4 percent in 2008 to 25.0 percent in 2014 as the economy struggled to recover from the crisis. Furthermore, the declining economy worsens alcohol abuse, with cases increasing by 143 percent (See Fig. 2). In light of these deteriorating statistics, the current study seeks to understand how the 2008–2014 economic declines affected mental health conditions (depression and traumatic stress), non-communicable conditions (cancer and diabetes), metabolic risks factors (alcohol abuse and hypertension), and communicable conditions (influenza, diarrhea, dry cough) of adolescent and adults comparatively.

1.2. Economic declines and health outcomes

So far, there are diverging conclusions on how economic decline affects health outcomes. According to Strumpf et al. (2017), economic decline is associated with increased local unemployment rates and better health outcomes in the United States of America (USA). Strumpf and colleagues argued that as more individuals lose their jobs, they cannot afford to consume alcohol, similar to the days of the economic boom. Meaning the spillover effects of a declining economy are good for society resulting in a decline in cardiovascular diseases.

Strumpf et al. (2017) support Ruhm's (2015) perspective and suggest that changes in health behaviors, such as the reduction in drinking, obesity, smoking, and physical inactivity during a state of economic decline, represent a credible and robust mechanism that backs up the claim that economic decline is better for societal health. However, Ruhm (2015) argued that such an intersection is not always visible in other high-income countries.

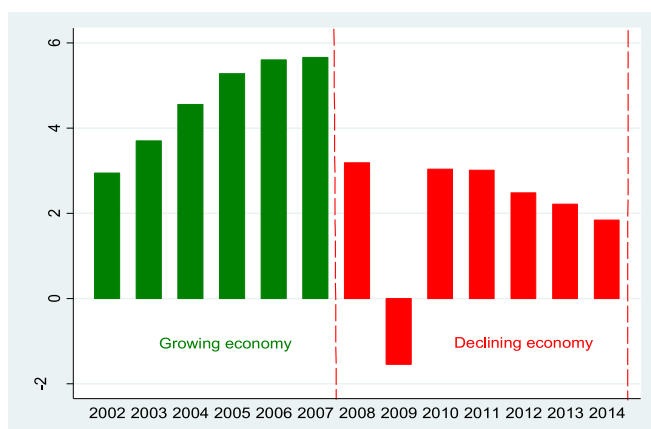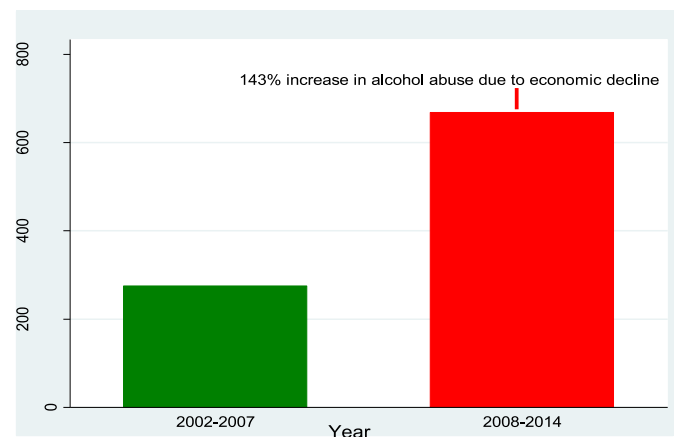For instance, Hiilamo et al. (2021) argued that there are countries

Fig. 2. Worsening alcohol abuse cases due to economic decline.
Source: Own elaboration according to the GHS data on South Africa 's alcohol abuse cases.

where economic decline is associated with increases in alcohol and substance abuse. It remains to be seen whether such increases in substance abuse also worsen mental ill-health, non-communicable diseases, and metabolic risk factors.

Cutler et al. (2016) analyzed high-income countries predominantly. They emphasized that pollution and the economic structure hold more considerable explanatory power in the relationship between economic decline and health outcomes. According to Cutler and colleagues, a declining economy is associated with worsening health outcomes in places where pollution is low.

On the other hand, when pollution is high and generated by the main economic sectors, a declining economy is associated with good health outcomes. This view is supported by Ionides et al. (2013), who discovered that a declining economy in the United States of America (USA) is associated with better respiratory diseases and traffic injuries.

So far, few studies have analyzed how a declining economy affects various health outcomes of adolescent population groups. According to Nguyen (2013), increased unemployment due to persisting economic decline is not related to poor maltreatment of children and adolescents when using data from California. Such evidence is also confirmed by Millett and Drake (2011), who argued that economic downturns are not associated with childhood maltreatment and poor mental well-being in the USA. More work is needed to advance this branch of literature and shows how economic decline affects other children's health outcomes besides childhood maltreatment.

Furthermore, only some comparative studies look at how economic decline affects the health outcomes of different population groups (Rees et al., 2017). In the USA, it is documented that families' from low-income backgrounds are likely to face financial shocks during a state of economic decline compared to families with better incomes (Elliott et al., 2013). However, there is little work examining how economic decline affects the health outcomes of individuals residing in rural versus urban areas or how economic decline affects adolescents (18-year cohorts) versus adults (25-year cohorts). There is a need to improve this branch of literature with a more comparative analysis to show how geographic and age factors deteriorate or mitigate the destruction of health outcomes during economic decline.

Hence, this paper uses a comparative analysis to explore findings that demonstrate the intersection between economic decline and health outcomes in Africa's most prosperous economy. The current study seeks to answer the following questions: (1) What impacts does the 2008–2014 economic decline exert on mental health conditions (depression and traumatic stress) of adolescents (18-year cohorts) and adults (25-year cohorts)? (2) What impacts do the 2008–2014 economic decline exert on metabolic risk factors (alcohol abuse and hypertension)

Fig. 1. Evolution of economic growth in South Africa.
Source: Own elaboration according to data from World Bank 2002–2014.

(3) What impacts do the 2008–2014 economic declines exert on non-communicable conditions (cancer and diabetes) of adolescents and young adults? (4) What impacts do the 2008–2014 economic declines exert on adolescent and adults communicable conditions (influenza, diarrhea, and dry cough)? (4) Are there regional and gender-based differences in the impact of a declining economy on these conditions?

2. Methods

The author uses a recently released database, the General Household Survey (GHS), provided by Statistic South Africa from 2002 to 2014. The GHS is an annual survey of approximately 120,000 individuals from more than 20,000 households. These yearly surveys aim to provide information on changing trends in South African families' composition. The GHS sampling procedure involves explicit stratification by province and within each province by urban and non-urban areas. Household units are drawn under this stratification. For each household unit, individual characteristics are presented, including age, gender, educational outcomes, health outcomes, income levels, the status of alcohol abuse, and other general socio-economic status variables (Mostert & Vall, 2020).

The GHS structure questions for a binary response. For example, adults in the household are asked if each member of the household abuse alcohol. The general reply is either yes, the member abuse alcohol, or no, the member does not abuse alcohol. The GHS asked if the individual members of the household have suffered from depression, traumatic stress, diabetes, cancer (which covers leukemia, Hodgkin's lymphoma, Liver cancer, lung cancer, and other connective tissue tumors), hypertension, influenza infection, diarrhea (which covers rotavirus or norovirus that cause gastro-inflammations, *E. coli*, and Salmonella), and dry

25-year cohorts born 1983–1989). The author then compares these health outcomes to cohorts who did not experience the 2008–2014 economic declines (18-year cohorts born 1984–1989 and 25-year cohorts born 1977–1982) (See Fig. 3).

The blue line in Fig. 3 represents all the 18-year-old cohorts considered in the current analysis. Similarly, the yellow line represents the 25-year-old cohorts considered in the current analysis. The cohorts shaded in green refer to controls (because they have not been exposed to the 2008–2014 economic declines), while those shaded in red are the treated cohorts exposed to the 2008–2014 economic declines. The outcomes analyzed are all dummy variables reported by the head of the household when asked about the health outcomes of these cohorts: abusing alcohol, experiencing depression, traumatic stress, influenza, diarrhea, dry cough, and being diagnosed with diabetes, cancer, and hypertension.

The GHS also includes information on the employment status of households. However, the author did not want to directly compare households working decent jobs to those not working as a proxy for economic performance. These two groups of households can be different in many additional dimensions (for example income, education background, or information barriers), which can influence the exogenous aspect of the model and inflate the possible outcomes. For these reasons, the author did not use an OLS model (nonetheless, the author presents the OLS results in the robustness checks section). Instead, the author opted for a Two-stage Least Squared Model (2SLS) – similar to the analysis which was done by Mostert and Vall (2020) Mostert (2021), and Mostert et al. (2022). In this analysis, the author instrument the exposure to the 2008–2014 economic declines (Econ-Dec) with the birth cohort as presented below.

$$Y_i^a = \alpha_1 + \beta_1 \sim Econ - D_i \partial + \psi YearFE + \xi \Pr ovinceFE + \wp MotherEducationFE + \lambda FatherEducationFE + \sigma Female_i$$

$$Econ - D_i^a = \alpha_2 + \beta_2 Treat_i^a + \psi YearFE + \xi \Pr ovinceFE + \wp MotherEducationFE + \lambda FatherEducationFE + \sigma Female_i$$

cough (which covers upper respiratory infections including bacterial pneumonia).The general reply is either yes, the household member has suffered from these conditions, or no the member has not suffered from these conditions. The author uses these binary variables to quantify the changes in mental health conditions (depression and traumatic stress), non-communicable conditions (cancer and diabetes), metabolic risk factors (alcohol abuse and hypertension), and communicable conditions (influenza, diarrhea, dry cough) in individuals who were exposed to the 2008–2014 economic declines versus those who were not exposed to the 2008–2014 economic declines.

For quality purposes, all Statistic South Africa datasets are reviewed at regular intervals by the Statistician-General and the head of the relevant organ of state to ensure that they remain relevant and of specified quality. Therefore, the current binary variables reflect the genuine legal reality of South African social and health outcomes, which are worth to be used for international scholarship (Mostert et al., 2022).

The author linked the annual datasets of GHS to create panel data for the current analysis, similar to the strategy done by Mostert and Vall (2020) and Mostert (2021). Such panel creation benefitted the author in understanding the impacts of the 2008–2014 economic declines on these conditions. The author was able to track changes in the levels of alcohol abuse with a prevalence of 28% nationally, depression prevalence of over 41%, traumatic stress prevalence of 40%, diabetes prevalence of 46%, cancer prevalence of 35%, hypertension prevalence of 16%, influenza prevalence of 38%, diarrhea prevalence of 10%, and dry cough prevalence of 35%.

The author tracked these conditions in cohorts exposed to the 2008–2014 economic declines (18-year cohorts born 1990–1996 and

In the first equation, Y is one of the outcomes for individual ᵢ at age ɑ (18 or 25 years old), and "~Econ-D″ is the predicted exposure to the 2008–2014 economic decline. The regression includes calendar year fixed effects (which are equivalent to including cohort fixed effects), province fixed effects (including nine provinces in South Africa), and a dummy for females (for the regressions where the author estimates the effects for both girls and boys). Furthermore, the author includes controls (fixed effects) for both the mother and the father's educational level to proxy for the household socio-economic characteristics. In the second equation (which corresponds to the first stage regression of the 2SLS), the 2008–2014 economic decline is estimated as a function of the treatment dummy variable, which identifies the cohorts exposed to the economic decline (as depicted in Fig. 3). Therefore, when one looks at the health outcomes at age 18, for example, it is evident in Fig. 3 that cohorts born between 1984 and 1989 were not affected by the 2008–2014 economic declines, thus constituting the control group. Meanwhile, cohorts born between 1990 and 1996 were affected by the 2008–2014 economic decline and constituted the treatment group.

Similarly, when one looks at the health outcomes at age 25, it is evident in Fig. 3 that cohorts born between 1977 and 1982 were not affected by the 2008–2014 economic decline, thus constituting the control group. Meanwhile, 25-year cohorts born between 1983 and 1989 were affected by the 2008–2014 economic decline and constitute the treatment group.

The author focuses on these two critical ages: age 18, which corresponds to the age level of limited parental supervision, and age 25, which corresponds to the early career stages of adults in South Africa.
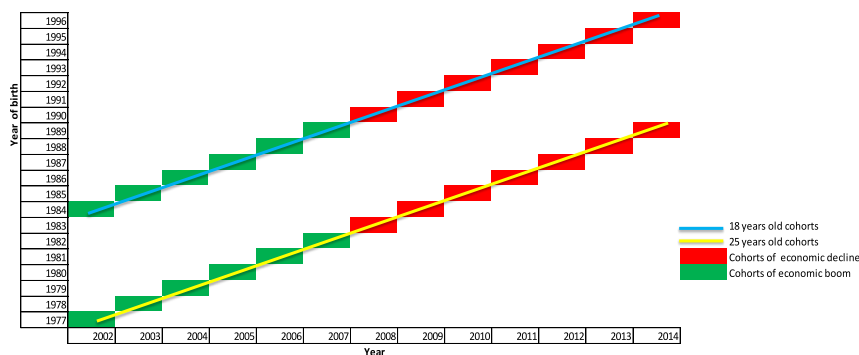
Fig. 3. Definition of treated and control groups according to the instrument (year of birth or cohort) for the current health outcomes analysis.
Source: Own elaboration according to the World Bank data on South Africa's economic performance.

The author also includes parental educational categories as proxies for household socio-economic status, which may influence health outcomes. The first stage regression also controls for gender, as well as year and province, fixed effects. Thus, the year (or cohort) fixed effects account for any trend in the outcome variable across cohorts. The province-fixed effects account for any baseline (time-invariant) difference in the outcome variables across provinces.

In all model estimations, one needs two assumptions to be fulfilled: first, the instrument has to be relevant in explaining the probability of being treated, and this will be corroborated by the F-test of the first stage equation; and second, the exclusion restriction needs to hold, that is, the instrument should not influence the primary outcome directly through any channel other than treatment. In this case, this assumption means that differences in health outcomes between the treated and control groups can only be due to the exposure to 2008–2014 economic declines.

Considering that the model includes the cohort (or year) fixed effects; therefore, the estimations are capturing any improvement (or deterioration) in health outcomes in any subsequent cohort (concerning the previous ones) that may be due to other causes, such as changes in cultural habits attributed to the state of economic performance. For example, let us look at Fig. 3, which defines the treated and control groups. There is no reason to believe that cohorts born in 1984–1989 (control group) should have different health outcomes than the cohorts born in 1990–1996 (treatment group) when observed at the same age (18 years old) after controlling for the year (or cohort) fixed effects. No other event in South African history explains any difference in health outcomes that would affect precisely the cohort born between 1990 and

1996 but not the cohort born just one, two, or three years before. The same argument applies to the 25-year cohorts. For this reason, the author is confident that the 2008–2014 economic declines can explain these differences presented in Fig. 4.

3. Results

3.1. Descriptive analysis

Table 1 presents the exact difference between the treatment and control groups. The cohorts exposed to the 2008–2014 economic declines (treated group) recorded higher cases of alcohol abuse, depression, trauma, diabetes, cancer, and hypertension than those not exposed to the 2008–2014 economic declines (control group). Furthermore, the treated cohorts recorded lower infectious conditions cases than the control group.

3.2. Results of the two-way 2SLS model

The tables present a comparative picture of how the 2008–2014 economic declines, which drove up unemployment and alcohol abuse, also affected other health conditions. When analyzing the 2SLS model estimations' results, the author noted that the first stage regression's F-statistic is very large, pointing towards the instrument's strong validity (See Table 2). Thus, in Table 2, the unemployment of the 2008–2014 economic declines proxied by the birth cohort instrument is a

Table 1
Descriptive statistics.

	Treated cohorts. (Economic decline)	Control cohorts (Economic boom)
Female	52.6%	53.2%
In urban rich provinces	59.0%	58.8%
Reported alcohol abuse	34.4%	21.1%
Reported depression cases	56.8%	42.8%
Reported trauma stress cases	44.9%	36.5%
Reported diabetic case	57.1%	34.3%
Reported cancer cases	39.7%	30.8%
Reported hypertension cases	19.8%	12.8%
Reported influenza cases	23.1%	39.5%
Reported cases of dry cough	44.7%	68.0%
Reported cases of diarrhea	18.4%	29.0%
Observations	75263	61579

Source: Own elaboration with data from General Household Survey (GHS) provided by Statistic South Africa from 2002 to 2014.
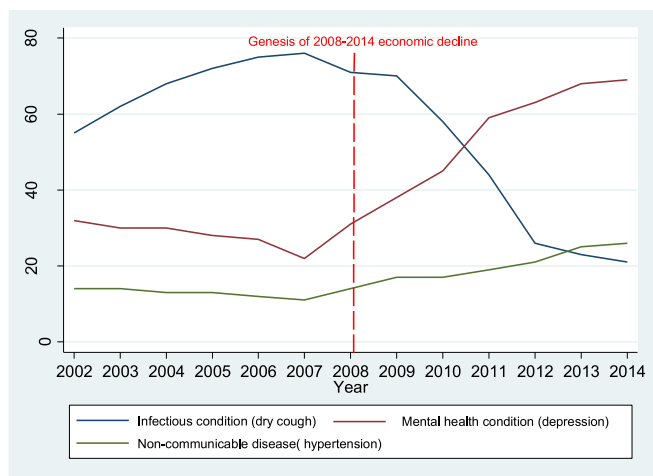

Fig. 4. Intersection between economic decline and health outcomes.
Source: Own elaboration according to data from Stats SA.

Table 2
2SLS estimation of the impact of 2008–2014 economic decline on alcohol abuse and mental health conditions.

2SLS	Age 18 years	Age 25 years
1st stage	Unemployed due to economic decline	Unemployed due to economic decline
Treatment (Birth cohorts)	0.4257[a] (0.0059)	0.6157[a] (0.0035)
Alcohol abuse		
2008–2014 Economic Decline	0.0207 (0.0246)	0.0427[a] (0.0172)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for alcohol abuse	0.2116	0.3442
Observations	59689	77153
F-stat 1st SLS	256.1356	229.3251
R squared 2nd SLS	0.0722	0.0512
Depression		
2008–2014 Economic Decline	0.0737 (0.1140)	0.1169[a] (0.0150)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for depression	0.4283	0.5686
Observations	59689	77153
F-stat 1st SLS	286.5556	254.7589
R squared 2nd SLS	0.0699	0.0498
Traumatic stres		
2008–2014 Economic Decline	0.0696 (0.3430)	0.1911[a] (0.0521)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for trauma	0.2816	0.5328
Observations	59689	77153
F-stat 1st SLS	275.2150	221.1142
R squared 2nd SLS	0.0701	0.0522

[a] Denote significant p value at <0.05. Coefficients in brackets represent standard errors. Note: The results are from a 2SLS model. In the first stage equation the dependent variable is the probability of being exposed to a declining economy while the instrument is a dummy variable equal to 1 for the cohorts born in 1990–1996 (or 1983 to 1989 for age 25) and 0 for the cohorts born in 1984–1989 (or 1977 to 1982 for age 25). In the second stage regression the dependent variable is a dummy variable of "suffering from mental health condition". Both regressions include year (cohort), province and gender fixed effects. Source GHS.

determinant for worsening mental health outcomes.

The main reason for increasing alcohol abuse was more free time available due to unemployment, more stress from losing a job, and seeking comfort in alcohol due to the loss of a stable source of income and social status (Bruguera et al., 2018). For example, cases of alcohol abuse increased by 4.27 percentage points in the 25-year cohorts significantly. The mean of alcohol abuse is 34.42 in this group (25-year cohorts). Therefore, the 2008–2014 economic declines increase the rate of alcohol abuse by 12.40 percent. These results are similar to European findings, where economic declines are associated with increased alcohol consumption and substance abuse (Bruguera et al., 2018).

Regarding depression cases, the model shows that the 2008–2014 economic declines increase depression by 11.69 percentage points in the 25-year cohorts significantly. The mean for depression is 56.86 in the 25-year cohorts. Therefore, the 2008–2014 economic declines increase the depression rate by 20.56.

Furthermore, the model shows in Table 2 that the 2008–2014 economic declines significantly increase traumatic stress cases by 19.11

percentage points in the 25-year cohorts. The mean for traumatic stress is 53.28. Therefore, the 2008–2014 economic declines significantly increased the traumatic stress cases rate by 35.86 percent for the 25-year cohorts.

The estimation shows that the 2008–2014 economic declines did not appear to have as significant an impact on the 18-year adolescent cohorts as on the 25-year cohorts. There is no significant increase in alcohol abuse, depression, or traumatic cases in the younger 18-year cohorts driven by the 2008–2014 economic declines. Parent protection for the younger 18-year cohorts (Karjalainen et al., 2019) and the responsible alcohol marketing policy of South Africa (Bertscher et al., 2018)- which prevent underage drinking could explain these insignificant alcohols abuse and mental health conditions recorded in the adolescent cohorts.

The study then examines whether the 2008–2014 economic declines worsen non-communicable conditions, considering that the economic fallout worsens cases of alcohol abuse, especially in the 25-year cohorts. The paper found in Table 3 that the 2008–2014 economic declines increase cases of non-communicable conditions in both 25-year cohorts and 18-year cohorts significantly. However, cases were better in the 18-year cohorts compared to the 25-year cohorts. For example, the 2008–2014 economic declines increase cancer cases by 7.36 percentage

Table 3
2SLS estimation of the impact of 2008–2014 economic decline on hypertension and non-communicable conditions.

2SLS	Age 18 years	Age 25 years
Cancer		
2008–2014 Economic Decline	0.0354 (0.0251)	0.0736[a] (0.0171)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for cancer	0.3083	0.3971
Observations	59689	77153
F-stat 1st SLS	211.3650	198.7925
R squared 2nd SLS	0.0604	0.0505
Diabetes		
2008–2014 Economic Decline	0.1317[a] (0.0212)	0.2525[a] (0.0130)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for diabetes	0.3433	0.5701
Observations	59689	77153
F-stat 1st SLS	294.3264	262.4758
R squared 2nd SLS	0.0655	0.0524
Hypertension		
2008–2014 Economic Decline	0.0029[a] (0.0013)	0.0045[a] (0.0011)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for hypertension	0.1283	0.1985
Observations	59689	77153
F-stat 1st SLS	288.4450	268.7742
R squared 2nd SLS	0.0714	0.0602

[a] Denote significant p value at <0.05. Coefficients in brackets represent standard errors. Note: The results are from a 2SLS model. In the first stage equation the dependent variable is the probability of being exposed to a declining economy while the instrument is a dummy variable equal to 1 for the cohorts born in 1990–1996 (or 1983 to 1989 for age 25) and 0 for the cohorts born in 1984–1989 (or 1977 to 1982 for age 25). In the second stage regression the dependent variable is a dummy variable of "suffering from non-communicable condition". Both regressions include year (cohort), province and gender fixed effects. Source GHS.

points in the 25-year population group, implying a significant 18.53 percent increase in cancer cases. On the other hand, the 2008–2014 economic declines did not significantly cause increases in cancer cases in the younger 18-year cohorts. Once again, parental protection limited alcohol abuse in these 18-year cohorts, which could explain these differences (Patel et al., 2021).

The 2008–2014 economic declines increase diabetic cases significantly by 38.36 percent and 44.29 percent in adolescent and adult populations. The sugar tax policy is more effective in reducing non-communicable conditions in adolescents (Goiana-da-Silva et al., 2020) than in adults. This explains the lower increase in diabetic cases in adolescents compared to adults since South Africa has a sugar tax policy. The 2008–2014 economic declines increase hypertension by 2.26 percent in both 25-year cohorts and 18-year cohorts significantly.

The author proceeded and analyzed the impact of the 2008–2014 economic declines on communicable conditions. The model shows that the economic fallout reduces communicable conditions significantly for both 18-year cohorts and 25-year cohorts, respectively (See Table 4). For example, the 2008–2014 economic declines reduced influenza cases by 12.10 percent in the 25-year cohorts compared to 12.00 percent in the 18-year cohorts. The 2008–2014 economic declines reduced cases of diarrhea by 16.72 percent in the 25-year cohorts compared to 12.93 in

Table 4
2SLS estimation of the impact of 2008–2014 economic decline on communicable conditions.

2SLS	Age 18 years	Age 25 years
Influenza		
2008–2014 Economic Decline	−0.0474[a]	−0.0280[a]
	(0.0029)	(0.0022)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for influenza	0.3950	0.2314
Observations	59689	77153
F-stat 1stSLS	191.2250	158.7114
R squared 2nd SLS	0.0586	0.0554
Diarrhea		
2008–2014 Economic Decline	−0.0375[a]	−0.0308[a]
	(0.0079)	(0.0061)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for diarrhea	0.2900	0.1842
Observations	59689	77153
F-stat 1stSLS	194.3554	162.3587
R squared 2nd SLS	0.0651	0.0588
Dry cough		
2008–2014 Economic Decline	−0.0388[a]	−0.0274[a]
	(0.0018)	(0.0025)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for dry cough	0.6800	0.4474
Observations	59689	77153
F-stat 1stSLS	200.1246	188.9851
R squared 2nd SLS	0.0684	0.0597

[a] Denote significant p value at <0.05. Coefficients in brackets represent standard errors. Note: The results are from a 2SLS model. In the first stage equation the dependent variable is the probability of being exposed to a declining economy while the instrument is a dummy variable equal to 1 for the cohorts born in 1990–1996 (or 1983 to 1989 for age 25) and 0 for the cohorts born in 1984–1989 (or 1977 to 1982 for age 25). In the second stage regression the dependent variable is a dummy variable of "suffering from communicable condition". Both regressions include year (cohort), province and gender fixed effects. Source GHS.

Table 5
2SLS estimation of the impact of 2008–2014 economic decline on alcohol abuse and mental health conditions by gender.

2SLS	Female	Male
Alcohol abuse		
2008–2014 Economic Decline	0.0134[a]	0.0501[a]
	(0.0045)	(0.0072)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for alcohol abuse	0.1465	0.4092
Observations	72389	64453
F-stat 1stSLS	176.4431	145.9842
R squared 2nd SLS	0.0592	0.0555
Depression		
2008–2014 Economic Decline	0.0892[a]	0.1014[a]
	(0.0104)	(0.0110)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for depression	0.5078	0.4899
Observations	72389	64453
F-stat 1stSLS	188.3321	143.2289
R squared 2nd SLS	0.0519	0.0521
Traumatic stress		
2008–2014 Economic Decline	0.0405[a]	0.2203[a]
	(0.0103)	(0.0101)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for trauma	0.2050	0.6091
Observations	72389	64453
F-stat 1stSLS	143.6650	101.4442
R squared 2nd SLS	0.0601	0.0622

[a] Denote significant p value at <0.05. Coefficients in brackets represent standard errors. Note: The results are from a 2SLS model. In the first stage equation the dependent variable is the probability of being exposed to a declining economy while the instrument is a dummy variable equal to 1 for the cohorts born in 1990–1996 (or 1983 to 1989 for age 25) and 0 for the cohorts born in 1984–1989 (or 1977 to 1982 for age 25). In the second stage regression the dependent variable is a dummy variable of "suffering from mental health condition". Both regressions include year (cohort), province and gender fixed effects. Source GHS.

the 18-year cohorts. The 2008–2014 economic declines reduced cases of dry cough by 16.72 percent in the 25-year cohorts compared to 12.90 percent in the 18-year cohorts. These findings support Ionides et al. (2013), who argued that economic decline is associated with improving respiratory conditions.

The study then examines gender-based differences in the overall sample population. The paper found in Table 5 that the 2008–2014 economic declines worsen the alcohol abuse cases for both males and females significantly. The decline caused a 9.14 percent significant increase in alcohol abuse in the female population compared to a 12.21 percent increase in the male population. The paper also found in Table 5 that the 2008–2014 economic declines worsen the depression cases of both males and females significantly. However, the 2008–2014 economic declines worsen the depression condition more significantly in the male population than in females. For example, the 2008–2014 economic declines worsened depression cases by 17.56 percent in the female population compared to 20.69 percent in the male population. The 2008–2014 economic decline increased traumatic stress cases by 19.72 percent in the female population group compared to 36.16 percent in the male population group. These results support the view that men experience higher mental ill-health conditions. However, these mental ill-health conditions are often not reported due to stigma

Table 6
2SLS estimation of the impact of 2008–2014 economic decline on hypertension and non-communicable conditions by gender.

2SLS	Female	Male
Cancer		
2008–2014 Economic Decline	0.0299[a]	0.0791[a]
	(0.0081)	(0.0012)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for cancer	0.2526	0.4529
Observations	72389	64453
F-stat 1st SLS	111.0250	100.0121
R squared 2nd SLS	0.0534	0.0551
Diabetes		
2008–2014 Economic Decline	0.2307[a]	0.1536[a]
	(0.0046)	(0.0032)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for diabetes	0.6608	0.3066
Observations	72389	64453
F-stat 1st SLS	123.0064	127.0058
R squared 2nd SLS	0.0579	0.0534
Hypertension		
2008–2014 Economic Decline	0.0043[a]	0.0032[a]
	(0.0010)	(0.0011)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for hypertension	0.2234	0.1034
Observations	72389	64453
F-stat 1st SLS	132.2210	121.2302
R squared 2nd SLS	0.0514	0.0502

[a] Denote significant p value at <0.05. Coefficients in brackets represent standard errors. Note: The results are from a 2SLS model. In the first stage equation the dependent variable is the probability of being exposed to a declining economy while the instrument is a dummy variable equal to 1 for the cohorts born in 1990–1996 (or 1983 to 1989 for age 25) and 0 for the cohorts born in 1984–1989 (or 1977 to 1982 for age 25). In the second stage regression the dependent variable is a dummy variable of "suffering from non-communicable condition". Both regressions include year (cohort), province and gender fixed effects. Source GHS.

Table 7
2SLS estimation of the impact of 2008–2014 economic decline on communicable conditions by gender.

2SLS	Female	Male
Influenza		
2008–2014 Economic Decline	−0.0356[a]	−0.0398[a]
	(0.0021)	(0.0016)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for influenza	0.4029	0.2235
Observations	72389	64453
F-stat 1st SLS	107.0050	108.1214
R squared 2nd SLS	0.0584	0.0508
Diarrhea		
2008–2014 Economic Decline	−0.0412[a]	−0.0271[a]
	(0.0012)	(0.0031)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for diarrhea	0.3500	0.1243
Observations	72389	64453
F-stat 1st SLS	104.9954	101.1087
R squared 2nd SLS	0.0559	0.0579
Dry cough		
2008–2014 Economic Decline	−0.0431[a]	−0.0252[a]
	(0.0018)	(0.0025)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for dry cough	0.3019	0.1722
Observations	72389	64453
F-stat 1st SLS	100.3316	112.0751
R squared 2nd SLS	0.0589	0.0577

[a] Denote significant p value at <0.05. Coefficients in brackets represent standard errors. Note: The results are from a 2SLS model. In the first stage equation the dependent variable is the probability of being exposed to a declining economy while the instrument is a dummy variable equal to 1 for the cohorts born in 1990–1996 (or 1983 to 1989 for age 25) and 0 for the cohorts born in 1984–1989 (or 1977 to 1982 for age 25). In the second stage regression the dependent variable is a dummy variable of "suffering from communicable condition". Both regressions include year (cohort), province and gender fixed effects. Source GHS.

(Chatmon, 2020).

The paper found in Table 6 that the 2008–2014 economic declines worsen the hypertension cases of both males and females significantly. The decline caused a 1.92 percent significant increase in hypertension cases in the female population group compared to a 3.09 percent increase in the male population. The paper also found in Table 5 that the 2008–2014 economic declines worsen the cancer cases of both males and females significantly. However, the 2008–2014 economic declines worsen the cancer conditions more robustly in the male population group than in females. For example, the 2008–2014 economic declines worsened cancer cases by 11.83 percent in the female population compared to 17.46 percent in the male population. The 2008–2014 economic decline increased diabetic cases by 38.01 percent in the female population group compared to 50.09 percent in the male population group. These results support the view that men die early than women due to high NCDs (Crimmins et al., 2019).

Table 7 shows that the 2008–2014 economic declines significantly reduced the communicable conditions of both males and females. The decline caused an 8.83 percent decrease in influenza cases in the female population group compared to a 17.80 percent decrease in the male population group. The paper also found in Table 7 that the 2008–2014 economic declines reduced the diarrhea cases of both males and females

significantly. However, the 2008–2014 economic declines reduce the diarrhea cases more robustly in the male population group than in females. For example, the 2008–2014 economic decline decreased diarrhea cases by 11.77 percent in the female population compared to 21.80 percent in the male population. The 2008–2014 economic declines decrease dry cough cases by 14 percent in both the female and male populations. These results are in line with international studies. Women tend to suffer more from infectious conditions than men (World Health Organisation WHO, 2007), which explains the modest improvement in the listed communicable conditions in the female population group compared to males.

The study then examines regional-based differences. The paper found in Table 8 that the 2008–2014 economic declines worsen alcohol abuse in both rural and urban populations significantly. The decline caused a 10.37 percent increase in alcohol abuse in the rural population group compared to a 12.09 percent increase in the urban population group. The paper also found in Table 8 that the 2008–2014 economic declines worsen the depression cases of both rural and urban populations significantly. However, the 2008–2014 economic declines worsen the depression condition more intensely in the urban population group than in rural regions. For example, the 2008–2014 economic declines worsened depression cases by 5.42 percent in the rural

Table 8

2SLS estimation of the impact of 2008–2014 economic decline on alcohol abuse and mental health conditions by region.

2SLS	Rural	Urban
Alcohol abuse		
2008–2014 Economic Decline	0.0224[a]	0.0410[a]
	(0.0010)	(0.0015)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for alcohol abuse	0.2160	0.3390
Observations	56105	80737
F-stat 1st SLS	113.1231	125.1242
R squared 2nd SLS	0.0572	0.0595
Depression		
2008–2014 Economic Decline	0.0266[a]	0.1641[a]
	(0.0019)	(0.0010)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for depression	0.4899	0.5077
Observations	56105	80737
F-stat 1st SLS	118.7721	113.5589
R squared 2nd SLS	0.0533	0.0539
Traumatic stress		
2008–2014 Economic Decline	0.0303[a]	0.2306[a]
	(0.0041)	(0.0047)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for trauma	0.2528	0.5616
Observations	56105	80737
F-stat 1st SLS	109.3350	106.2242
R squared 2nd SLS	0.0591	0.0602

[a] Denote significant p value at <0.05. Coefficients in brackets represent standard errors. Note: The results are from a 2SLS model. In the first stage equation the dependent variable is the probability of being exposed to a declining economy while the instrument is a dummy variable equal to 1 for the cohorts born in 1990–1996 (or 1983 to 1989 for age 25) and 0 for the cohorts born in 1984–1989 (or 1977 to 1982 for age 25). In the second stage regression the dependent variable is a dummy variable of "suffering from mental health condition". Both regressions include year (cohort), province and gender fixed effects. Source GHS.

Table 9

2SLS estimation of the impact of 2008–2014 economic decline on hypertension and non-communicable conditions by region.

2SLS	Rural	Urban
Cancer		
2008–2014 Economic Decline	0.0433[a]	0.0658[a]
	(0.0051)	(0.0062)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for cancer	0.2941	0.4113
Observations	56105	80737
F-stat 1st SLS	131.0350	132.7721
R squared 2nd SLS	0.0555	0.0598
Diabetes		
2008–2014 Economic Decline	0.1079[a]	0.2764[a]
	(0.0021)	(0.0045)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for diabetes	0.2776	0.6356
Observations	56105	80737
F-stat 1st SLS	113.2209	117.6658
R squared 2nd SLS	0.0579	0.0534
Hypertension		
2008–2014 Economic Decline	0.0027[a]	0.0048[a]
	(0.0010)	(0.0013)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for hypertension	0.1325	0.1943
Observations	56105	80737
F-stat 1st SLS	110.5510	113.0502
R squared 2nd SLS	0.0514	0.0502

[a] Denote significant p value at <0.05. Coefficients in brackets represent standard errors. Note: The results are from a 2SLS model. In the first stage equation the dependent variable is the probability of being exposed to a declining economy while the instrument is a dummy variable equal to 1 for the cohorts born in 1990–1996 (or 1983 to 1989 for age 25) and 0 for the cohorts born in 1984–1989 (or 1977 to 1982 for age 25). In the second stage regression the dependent variable is a dummy variable of "suffering from non-communicable condition". Both regressions include year (cohort), province and gender fixed effects. Source GHS.

population compared to 32.32 percent in the urban population. The 2008–2014 economic declines increased traumatic stress cases by 11.98 percent in the rural population group compared to 41.06 percent in the urban population group. These results reflect the population dynamics in South Africa-with urban regions having the highest population density than the rural part of South Africa.

Table 9 shows that the 2008–2014 economic declines worsen hypertension and non-communicable conditions in the urban region more than in the rural region. Table 10 shows that the 2008–2014 economic declines resulted in better improved communicable conditions in the rural regions than in the urban population. Once again, population dynamics play a significant role in ensuring better outcomes in rural regions due to low population density, which limits the easy spread of infections.

4. Discussion

There has been a renewed interest in the relationship between economic decline and health outcomes as the world battle the covid-19 economic crisis (Hensher, 2020). The literature provides mixed evidence, with some studies arguing that health outcomes get better with improvements in economic conditions and others finding the opposite.

One of the differences between these studies is the level of analysis: studies using aggregated data tend to find that health outcomes worsen during bad economic times, whereas studies that use individual-level data tend to find the opposite.

The current study has applied individual-level and aggregated panel data on a sample of South African adolescents and adults to shed light on this issue. Economic decline worsens alcohol abuse, with an average of 11 percent for adolescent and adult populations. The current results support international studies -where it was discovered that economic decline is associated with increased alcohol consumption and other substance abuse (Hiilamo A et al., 2021).

The declining economy worsens depression by 19 percent and traumatic stress by 30 percent in South Africa. Such findings concur with the recent review article, where it was reported that economic decline worsens depression and traumatic stress cases (Guerra & Eboreime, 2021).

Economic decline has aggravating effects on cancer, diabetes, and hypertension. The declining economy worsens cancer, with an average of 15 percent for adolescents and adults. The same state worsens diabetes and hypertension, respectively. These findings support the view expressed by Cohen et al. (2015). They argued that economic decline harms the epidemiology of non-communicable conditions due to drastic

Table 10
2SLS estimation of the impact of 2008–2014 economic decline on communicable conditions by region.

2SLS	Rural	Urban
Influenza		
2008–2014 Economic Decline	−0.0487[a]	−0.0267[a]
	(0.0038)	(0.0041)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for influenza	0.2010	0.4254
Observations	56105	80737
F-stat 1st SLS	107.0050	108.1214
R squared 2nd SLS	0.0504	0.0511
Diarrhea		
2008–2014 Economic Decline	−0.0451[a]	−0.0230[a]
	(0.0012)	(0.0018)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for diarrhea	0.2983	0.1652
Observations	56105	80737
F-stat 1st SLS	102.5956	107.1667
R squared 2nd SLS	0.0548	0.0566
Dry cough		
2008–2014 Economic Decline	−0.0399[a]	−0.0282[a]
	(0.0023)	(0.0043)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for dry cough	0.3481	0.1258
Observations	56105	80737
F-stat 1st SLS	100.3316	112.0751
R squared 2nd SLS	0.0609	0.0607

[a] Denote significant p value at <0.05. Coefficients in brackets represent standard errors. Note: The results are from a 2SLS model. In the first stage equation the dependent variable is the probability of being exposed to a declining economy while the instrument is a dummy variable equal to 1 for the cohorts born in 1990–1996 (or 1983 to 1989 for age 25) and 0 for the cohorts born in 1984–1989 (or 1977 to 1982 for age 25). In the second stage regression the dependent variable is a dummy variable of "suffering from communicable condition". Both regressions include year (cohort), province and gender fixed effects. Source GHS.

cuts in public health expenditure and increasing income inequality.

Economic decline has a positive spillover effect on communicable conditions. The paper documented a reduction in influenza, diarrhea, and dry cough during the state of decline. More specifically, the declining economy reduced influenza cases by an average of 12 percent for adolescent and adult populations. The declining economy reduces diarrhea and dry cough by 15 percent. One possible explanation is that economic declines limit economic activity, water poisoning by the industries, consumption of fancy food in restaurants, and person-to-person interactions. These factors limit the spread of infectious conditions like influenza, diarrhea, and dry cough. These findings collaborate with the evidence presented by Ionides et al. (2013). These authors discovered that a declining economy in the United States of America (USA) is associated with better respiratory diseases.

Regional, gender, and age factors also play an essential role in determining the relationship between mental health conditions, metabolic risk factors, communicable conditions, non-communicable conditions, and economic decline. The current estimation shows that the 25-year cohorts are worse affected by economic declines resulting in high mental ill-health and non-communicable conditions.

One reason may be that adults (25-year cohorts) are more likely to have permanent positions at work. Therefore, economic decline is more likely to affect the 25-year- adult cohorts than the 18 – year adolescent cohorts who are slowly migrating out of parental supervision. Hence, the economic decline is associated with significantly higher levels of traumatic stress, alcohol abuse, hypertension, cancer, and diabetes in the adult population than in the younger adolescent cohorts.

4.1. Policy implications

The ongoing covid-19 economic crisis continues to deteriorate South African economic growth. Such an economic downturn will worsen cases of mental ill-health (Cheng et al., 2021). As Katsonga-Phiri et al. (2021) recommended, Africa must develop progressive policies to address worsening mental health outcomes, especially during economic decline. The current paper supports the call for creating a financial buffer to deal with rising mental ill-health and non-communicable diseases during bad economic times. Furthermore, funding national health promotion policy programs must be increased countercyclical to avert the increasing cases of mental ill-health and non-communicable conditions. These policy proposals will go a long way in improving mental health conditions and non-communicable conditions during the current covid-19 economic crisis.

4.2. Robustness test

In this section, the author provides robustness checks and additional results to reinforce the current estimation's validity. Table 1A in the Appendix shows the OLS regressions' results for mental health conditions for comparison purposes. The variable of interest is now the variable in the survey that identifies households with no jobs as a proxy for economic decline. The paper also includes calendar year fixed effects, province fixed effects, and a dummy for females. Furthermore, the author includes controls (fixed effects) for both the mother and the father's educational level to proxy for the household socio-economic characteristics. As explained above, the author has reasons to believe that this is not a randomly assigned analysis.

Many unobserved variables may directly affect mental health and non-communicable diseases, such as household income, access to the necessary information, proximity to alcohol relative healthcare facilities, etc. The OLS estimation may overestimate or underestimate the effects of the 2008–2014 economic decline on mental health conditions. Indeed, the results in Table 1A are all substantially bigger in magnitude than the baseline results of the 2SLS models presented in Table 2, which is consistent with the OLS model overestimating the actual effects of the 2008–2014 economic decline.

Finally, the author ran some placebo regressions in which the study "pretended" that the unaffected cohorts were treated with a fake 2008–2014 economic decline. The author was then able to assign as treated cohorts affected by the fake reform those born in 1984, 1985, 1986 (18-year cohort), 1977,1978,1979 (25-year cohort) and use as comparison cohorts those born in 1987, 1988, 1989 (18-year cohort), 1980, 1981,1982 (25-year cohort). The author then runs the same 2SLS.

One can see in Table 2A in the Appendix that the F-test of the first-stage regression is extremely low (which suggests that the instrument is not relevant). The treatment variable is not significant in any of the health outcomes analyzed. Therefore, the results of these placebo tests analyzing the effects of the fake reforms reinforce the validity of the study's identification strategy and provide additional evidence of the fulfillment of the exclusion restriction criteria, as any cohort-specific events not captured by the year effects that could be biasing the main results should also provide significant results in these placebo tests (Mostert et al., 2022).

4.3. Limitations

The author acknowledges that the current binary variables do not capture all epidemiological outcomes linked to these cohorts.

Furthermore, there is no advanced information on the determinants of mental health and non-communicable conditions in the GHS data. Thus, the author interprets the results as evidence of substantial deterioration in mental health and non-communicable conditions attributed to the 2008–2014 economic declines while not capturing other qualitative changes that may further explain these health outcomes. For example, depression can also be driven by household factor-like domestic abuse. Unfortunately, the GHS data does not contain comprehensive information on domestic abuse for the analyzed period, which should have been controlled in the analysis. Nevertheless, the author believes such omission will not significantly influence the current estimation considering that alcohol is still the primary driver of poor mental health.

5. Conclusion

The 2008–2014 economic declines worsen South African adults' mental health and non-communicable conditions. The idea of having countercyclical funds to manage these worsening conditions during an economic decline is warranted.

Author statement

This is a solo authored article. The concept, data analysis, and writing exercise of the paper were all done by CM Mostert.

Declarations of interest

The author reports no conflicts of interests.

Ethical approval

Our institution does not require ethical approval for this type of study.

Availability of data and materials

The data that support the findings of this study is available from STATSA upon reasonable request.

Data availability

Data will be made available on request.

Appendix

OLS Estimation

Table 1A
OLS estimation of the impact of 2008–2014 economic decline on mental health conditions.

OLS	Age 18 years	Age 25 years
Alcohol Abuse		
2008–2014 Economic Decline	0.0422	0.0749***
	(0.346)	(0.0272)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for alcohol abuse	0.2116	0.3442
Observations	59689	77153
Depression		
2008–2014 Economic Decline	0.1378***	0.2108***
	(0.0254)	(0.0711)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for depression	0.2116	0.3442
Observations	59689	77153
Trauma		
2008–2014 Economic Decline	0.1022***	0.2201***
	(0.0241)	(0.0701)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Mean for trauma	0.2816	0.5328
Observations	59689	77153

***denote significant p value at <0.05. Coefficients in brackets represent standard errors.
Note: The results are from an OLS model. Source GHS.

Placebo Test

Table 2A
2SLS estimation of the impact of 2008–2014 economic decline on mental health conditions.

2SLS	Age 18 years	Age 25 years
Alcohol Abuse		
2008–2014 Economic Decline	0.0607	0.0927
	(0.1246)	(0.1872)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Observations	26860	34719
F-stat 1stSLS	0.1356	0.3251
Depression		
2008–2014 Economic Decline	0.1137	0.1699
	(0.4114)	(0.7550)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Observations	26860	34719
F-stat 1stSLS	0.2560	0.5024
Trauma		
2008–2014 Economic Decline	0.2878	0.3607
	(0.9872)	(1.0781)
Year FE	YES	YES
Province FE	YES	YES
Gender FE	YES	YES
Mother education FE	YES	YES
Father education FE	YES	YES
Observations	26860	34719
F-stat 1stSLS	0.1150	0.1947

Coefficients in brackets represent standard errors.Note: The results are from a 2SLS model. In the first stage equation the dependent variable is the probability of being exposed to a declining economy while the instrument is a dummy variable equal to 1 for the cohorts born in 1990–1996 (or 1983 to 1989 for age 25) and 0 for the cohorts born in 1984–1989 (or 1977 to 1982 for age 25). In the second stage regression the dependent variable is a dummy variable of "suffering from mental health condition". Both regression include year (cohort), province and gender fixed effects. Source GHS.

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