RESEARCH ARTICLE

Single motherhood, social independence and non-communicable disease (NCD) outcomes among young females (15-24 years old) in South Africa [version 2; peer review: 1 approved with reservations]

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Abstract

Background: Non-communicable diseases (NCDs) acquired during youth follow into and affect adulthood. The association between young mother's social independence and NCD status is of policy interest due to its effect on economic and social development. This study aimed to determine the causal relationship between social independence and NCD outcomes among young, single mothers in South Africa.

Methods: Data from the South African National Income Dynamics Survey (NIDS) in 2008 and 2017 was used to determine if single mothers developed hypertension, diabetes or asthma by various indicators of social independence, including highest level of education and employment status. The sample was initially made-up of unmarried females (15-24 years old) without any children in 2008. Both fertility and social independence was followed-up to 2017.

Results: In total, 66 young females developed an NCD by 2017 and 87% (n=57) of these women had a child in the interim period. Employment of young females increased from 4.78% in 2008 to 37.79% in 2017, but completion of secondary or tertiary education declined from 67.94% in 2008 to 56.01% in 2017. In addition, half (50.88%) of the young females were partially independent by 2017, with only 11.03% being fully independent at this time. Finally, logistic regression results showed that the likelihood of developing an NCD increased if young females with children were not socially independent.

Conclusions: The relationship between social independence and NCDs suggest that policies and programmes in South Africa need to incorporate socioeconomic status as a determinant of disease and in particular, need to address socioeconomic indicators as additive measures and not autonomous indicators.
Keywords
Non-communicable diseases, social independence, single mothers, South Africa, NIDS data, logistic regression

This article is included in the African Population Health Research Center gateway.

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Author roles: De Wet-Billings N: Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Software, Supervision, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

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The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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First published: 14 Jun 2021, 4:31 https://doi.org/10.12688/aasopenres.13238.1
In sum, I have made the following changes as per the reviewers comments:
1. all reference to causal contribution has been re-written
2. all typographical errors have been fixed.
3. Table 3 has been checked and there was an error in the copy and paste function on my side. I have thoroughly checked the table and pasted it in new in the text. I also fixed the write-up for the table.

Any further responses from the reviewers can be found at the end of the article

Introduction
In recent years, the screening, diagnosis, treatment and maintenance of non-communicable diseases (NCDs) in developing countries has increased dramatically1-3. However, the prevalence of diseases such as hypertension, diabetes, and obesity in African countries remains high at 5%, 46%, and 27%, respectively4. Further, it is estimated that by 2030, deaths from NCDs are likely to increase globally by 17% and in Africa by 27%. This is in addition to the high burden of disease and death in the region caused by communicable diseases such as HIV/AIDS, malaria and tuberculosis, which remain persistently high5-7.

In South Africa, this double-burden of communicable and non-communicable disease is high with adult HIV and AIDS prevalence at 19% overall and 23% among females and 13% among males8. Furthermore, 12% of all adults (aged 15 years and older) have hypertension, 2.1% diabetes and 1.8% high cholesterol9. In addition to this, disease comorbidities are increasing, with one study finding that 26.9% of patients with tuberculosis had a second co-existent disease or comorbidity and 25.3% had more than one comorbidity or multi-morbidity10. This complication of co-existing diseases makes treatment and management of disease costly, complicated and difficult in South Africa where social inequality is high. Research has found that poverty, service delivery challenges and gender imbalances contribute to disease and mortality in the country11,12. One study found a strong correlation between higher levels of household poverty and a higher likelihood of being ill due to AIDS or being AIDS-unwell13. In fact, a number of comparative studies have shown that females in South Africa are more affected by social inequality than males14-17.

Global literature has proven that females who are empowered and independent have better health outcomes than those who are not18-20. Studies on education have shown that when girls are educated they are in a better position to provide financially for themselves and their families21. In a different study, it was found that females who are not victims of gender-based and intimate partner violence, are more likely to have control over their reproductive behaviour and can limit or space child births22. Finally, studies have shown that when females are employed they develop decision-making authority within their households and this in turn positively impacts the health outcomes of their children23,24.

Single motherhood in South Africa is fairly common with 43.1% of young children living with their mothers only25. Despite social welfare and assistance26 made available to single mothers, many still live in poverty and are more likely to be economically insecure which is a combination of unemployment, contract or part-time employment, accessing a social grant from the state and earning below average income compared to unmarried young females without children27,28. For young single mothers, it is a struggle to complete schooling, find employment and obtain financial support from fathers29-31. Young women in general are also affected by NCDs with rates of hypertension (17%), diabetes (1%) and asthma (9.5%) being the highest among 15–24 year olds32. The purpose of this study is to better understand the relationship between social empowerment or independence and NCD outcomes among single mothers over time.

Methods
Study design and data source
Nationally representative longitudinal data from the South African National Income Dynamics Survey (NIDS) 2008 and 2017 are used for this study. The NIDS data is a panel survey funded by the Department of Planning, Monitoring and Evaluation (DPME), Government of South Africa. The NIDS is conducted by the Southern Africa Labour and Development Research Unit (SALDRU) at the University of Cape Town (UCT)33. The study covers important contemporary issues, including poverty and well-being, household structure, fertility and mortality, migration, labour market participation, health, education, vulnerability and social capital among others34. Ethical approval was obtained by SALDRU to interview participants. The data made available to the author for analysis was completely anonymised.

Study population and sample
The study population for this longitudinal study, is females aged 15–24 years old in the first wave of the survey, 2008, who developed at least one non-communicable disease (NCD) by the latest wave of data in 2017. There were no other eligibility criteria. The total number of females aged 15–24 years old in 2008 was 2,467 (n). From this number, females with children (n= 891) were excluded and Figure 1 shows how the sample was derived to include young females with no children, who were unmarried and did not have any NCDs in 2008 (n=1,528) and followed through to 2017. However, a further 426 participants were not followed up and so the overall 2017 sample of young females was 1,048. This was then separated into the females without children (n=213), those who married (n=12) and those of interest, who are females in 2017 who had given birth but remained unmarried (n=835). The Figure further shows the number and percentage of females who are socially dependent (Dep), with average social independence (partial) and are socially independent (Indep) by 2017.

Variable measurement
The outcome variable of this study is NCDs. Three NCDs were selected from the data based on highest prevalence in 2017 and are high blood pressure, diabetes and asthma. In 2017, respondents were asked if they had been diagnosed with each of these conditions, and if so, they were asked if it was controlled in terms of medication, symptoms and diet. The response was dichotomised to consider if the respondents had controlled their condition by medication or not. The data was then used to calculate the number of NCDs that each individual female has. The outcome variable of this study is NCDs. Three NCDs were selected from the data based on highest prevalence in 2017 and are high blood pressure, diabetes and asthma. In 2017, respondents were asked if they had been diagnosed with each of these conditions, and if so, they were asked if it was controlled in terms of medication, symptoms and diet. The response was dichotomised to consider if the respondents had controlled their condition by medication or not. The data was then used to calculate the number of NCDs that each individual female has.
of these (and other) diseases to which they responded ‘yes’ or ‘no’. By 2017, 42 (n) females had developed high blood pressure, 10 (n) developed diabetes and 16 (n) had asthma. Respondents with more than one of these diseases or comorbidities (n=2), were dropped from the analysis. A variable, ‘NCD’ was generated to reflect whether respondents had one of these diseases (yes) or not (no) and is used in the logistic regression analysis.

Social independence is an additive index variable which consists of the employment status (yes/no); highest level of education attained (less than secondary/ secondary or tertiary); and if the respondent was a main decision-maker in their household (yes/no) by 2017. This variable is classified as dependent, partially independent, or independent. Those not employed, with less than secondary education and not a main decision-maker are classified as dependent. Those with less than secondary education and either unemployed but are the main decision-maker, or are employed but not the main decision-maker are classified as partially independent; Those who are employed, have completed secondary or tertiary education and are the main decision-makers in their households are classified as independent. The rationale for this classification is based on prior studies whereby education, employment and decision-making authority are among the characteristics used to measure a females independence from her partner, spouse and family as well as her autonomy.[33–35]

The control variables for this study are age of the respondent, race or population group using the South African Census classifications of African/Black, Coloured, White, Indian or Asian and Other; religious affiliation (Christian or none/other), and life satisfaction level. For the latter variable, respondents are asked to rate their level of life satisfaction from 1 (unsatisfied) to 10 (satisfied). For this study, respondents who rated their life satisfaction between 1 and 3 are ‘unsatisfied’; 4 and 6 are ‘average’ and 7 to 10 are ‘satisfied’.

**Statistical analysis**
Analyses were performed using Stata software version 14. Frequency and percentage distributions are used to describe the study population at baseline in 2008 and for the follow-up period in 2017. Logistic regression was used to identify the relationship between social independence and NCDs among young single mothers in South Africa.
Results

Table 1 shows the characteristics of the sample carried forward from 2008 to 2017. The table shows the characteristics of the female respondents in 2008. Almost 67% of all female respondents were 15–19 years old in 2008 and 84.49% were African. Further, 11.47% of the respondents were Coloured and 20.66% were not in school at the time, while 66.10% were in secondary school. By level of life satisfaction, 37.21% were averagely satisfied and 34.49% were satisfied. Finally, by religious affiliation, 86.91% of the sample was Christian.

Table 2 shows the temporal change in various social independence measures from 2008 and 2017. Unemployment went down from 95.22% of the sample in 2008 to 62.21% in 2017. The percentage of females with secondary or tertiary education declined from 67.94% in 2008 to 56.01% in 2017. Finally, the percentage of young females who became main decision makers in their households increased from 4.63% in 2008 to 34.34% in 2017.

Table 1. Percentage distribution of demographic characteristics among young females, 2008.

<table>
<thead>
<tr>
<th>Respondent Characteristics</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,360*</td>
<td>100</td>
</tr>
<tr>
<td>Age Group in 2008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–19</td>
<td>907</td>
<td>66.69</td>
</tr>
<tr>
<td>20–24</td>
<td>453</td>
<td>33.31</td>
</tr>
<tr>
<td>Population Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>1,149</td>
<td>84.49</td>
</tr>
<tr>
<td>Coloured</td>
<td>156</td>
<td>11.47</td>
</tr>
<tr>
<td>Asian/Indian</td>
<td>22</td>
<td>1.62</td>
</tr>
<tr>
<td>White</td>
<td>33</td>
<td>2.43</td>
</tr>
<tr>
<td>Level in School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not in school</td>
<td>281</td>
<td>20.66</td>
</tr>
<tr>
<td>Primary</td>
<td>155</td>
<td>11.4</td>
</tr>
<tr>
<td>Secondary</td>
<td>899</td>
<td>66.1</td>
</tr>
<tr>
<td>Tertiary</td>
<td>25</td>
<td>1.84</td>
</tr>
<tr>
<td>Level of Life Satisfaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsatisfied</td>
<td>385</td>
<td>28.31</td>
</tr>
<tr>
<td>Average</td>
<td>506</td>
<td>37.21</td>
</tr>
<tr>
<td>Satisfied</td>
<td>469</td>
<td>34.49</td>
</tr>
<tr>
<td>Religious Affiliation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None/Other</td>
<td>178</td>
<td>13.09</td>
</tr>
<tr>
<td>Christian</td>
<td>1,182</td>
<td>86.91</td>
</tr>
</tbody>
</table>

*This total excludes the 12 young females who married in 2017

Table 2. Percentages of social independence over time, 2008 and 2017.

<table>
<thead>
<tr>
<th>Social Independence Measure</th>
<th>2008</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>n= 1,360</td>
<td></td>
<td>n= 1,048</td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>95.22*</td>
<td>62.21*</td>
</tr>
<tr>
<td>Employed</td>
<td>4.78*</td>
<td>37.79*</td>
</tr>
<tr>
<td>Completed School Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; Secondary</td>
<td>32.06*</td>
<td>43.99*</td>
</tr>
<tr>
<td>Secondary or Tertiary</td>
<td>67.94*</td>
<td>56.01*</td>
</tr>
<tr>
<td>Main Decision Maker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>95.37*</td>
<td>65.66*</td>
</tr>
<tr>
<td>Yes</td>
<td>4.63*</td>
<td>34.34*</td>
</tr>
</tbody>
</table>

*p-value<0.05

Figure 2 shows the percentage distribution of the social independence composite measure in 2008 and 2017. The graph shows that the percentage of dependent females increased from 27.5% in 2008 to 38.09% in 2017. Similarly, the percentage of independent females increased from 4.71% in 2008 to 11.03% in 2017. While the partial social independence decreased from 67.79% in 2008 to 50.88% in 2017.

Figure 3 shows the percentage distribution of specific non-communicable diseases by childbearing status (given birth) of respondents in 2017. The figure shows that among the females with high blood pressure 90.48% had given birth and 9.52% had not had a child between 2008 and 2017. For diabetes, 80% had given birth and among those females who developed asthma, 81.25% had given birth too.

Table 3 shows the results of two logistic regression models measuring the likelihood of the outcome of NCD development (at least one of the three) by the characteristics of single mothers in 2008 (Wave 1) and 2017 (Wave 5). Using Wave 1 characteristics, single mothers were less likely to develop an NCD by Wave 5 if their life satisfaction was above unsatisfactory (OR=0.75; 95% CI: 0.021842-0.868864). Similarly, young mothers with average social independence (OR=0.68; 95% CI: 0.031213-0.842437) and were socially independent (OR=0.038; 95% CI: 0.031841-0.045547) in Wave 1, were also less likely to develop at least one NCD. Using the Wave 5 characteristics of young mothers, non-African/Black mothers were more likely to develop an NCD with and odds ratio of 1.41 (95% CI: 0.031753-1.837768). Similarly the odds of NCD development increases with life satisfaction (OR=1.40; 95% CI: 0.043053-1.860217) and average social independence (OR=1.46; 95% CI: 0.026927-1.842006), however the odds are lower if the young mothers are socially independent (OR=0.90; 95% CI: 0.029152-1.047172).
Table 3. Odds of non-communicable disease (NCD) development among single mothers in 2008 (Wave 1) and 2017 (Wave 5).

<table>
<thead>
<tr>
<th>Respondent's characteristics</th>
<th>Odds Ratio</th>
<th>P-Value</th>
<th>[95% Conf.] Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wave 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td>1.04</td>
<td>0.894</td>
<td>0.566791 1.917333</td>
</tr>
<tr>
<td>Population Group</td>
<td>1.73</td>
<td>0.058</td>
<td>1.714914 2.110144</td>
</tr>
<tr>
<td>Religion</td>
<td>1.41</td>
<td>0.479</td>
<td>0.544734 3.648989</td>
</tr>
<tr>
<td>Life Satisfaction</td>
<td>0.75</td>
<td>0.041</td>
<td>0.021842 0.868864</td>
</tr>
<tr>
<td>Average social independence</td>
<td>0.68</td>
<td>0.032</td>
<td>0.031213 0.842437</td>
</tr>
<tr>
<td>Social independence</td>
<td>0.40</td>
<td>0.038</td>
<td>0.031841 0.145547</td>
</tr>
<tr>
<td><strong>Wave 5</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td>1.01</td>
<td>0.886</td>
<td>0.897128 1.133999</td>
</tr>
<tr>
<td>Population Group</td>
<td>1.41</td>
<td>0.033</td>
<td>0.031753 1.837768</td>
</tr>
<tr>
<td>Religion</td>
<td>1.52</td>
<td>0.389</td>
<td>0.588163 3.914249</td>
</tr>
<tr>
<td>Life Satisfaction</td>
<td>1.40</td>
<td>0.045</td>
<td>0.043053 1.0860217</td>
</tr>
<tr>
<td>Average social independence</td>
<td>1.46</td>
<td>0.032</td>
<td>0.026927 1.842006</td>
</tr>
<tr>
<td>Social independence</td>
<td>0.90</td>
<td>0.037</td>
<td>0.029152 1.047172</td>
</tr>
</tbody>
</table>
Discussion

Young mothers face a number of social and economic challenges. For this reason, efforts to ensure the optimal health of young mothers are important. The main reason this study was done was to address the factors associated with non-communicable disease among young mothers with the aim of generating purposeful prevention. The study makes a contribution through the identification of the role of social independence on disease development among young, unmarried mothers in South Africa.

The study has identified a relationship between social independence and NCDs among young unmarried mothers in South Africa. At baseline, many of the young women were unemployed, had primary education only and were not main-decision makers in their households. While these indicators with time and more young females gained employment, secondary or tertiary education and became decision-makers, they also became first-time mothers. In addition, using the additive variable to measure overall independence, a large proportion of these young women remain socially dependent despite having become mothers. This is a common situation in African countries, with research showing that young, unmarried mothers are dependent on their households, families and the government for the welfare and assistance with children. In this study, it has been found that in addition to being socially dependent or partially dependent, young unmarried mothers are more likely to develop an NCD. Some of the NCDs addressed in this study are diabetes and hypertension. These diseases are also associated with the pre- and perinatal period, and could have been developed as a result of the pregnancy. With a chronic disease, young mothers are therefore less independent and rely on families and communities not only for the care of young children but also for assistance with the management of their conditions. It has been noted, that one of the main reasons patients with hypertension fail to manage their condition is due to a lack of adherence to treatment which includes taking medication and routine visits to the doctor. For young people, assistance in adherence, including payment for the costs of treatment, often comes from family members. In another study, it was also found that strong family support was positively associated with blood pressure control among hypertensive patients.

In addition to social independence, this study has found a relationship between life satisfaction and NCDs among young, unmarried mothers in the county. The results show that young mothers who are less satisfied with their lives overall, are more likely to develop an NCD. This is consistent with literature that shows young people in general who are not satisfied with their lives are less likely to take care of their physical and mental health. More specifically, young people who are more satisfied with their lives, are less likely to smoke cigarettes and more likely use sun protection, eat well and engage in physical exercise. However, the reverse relationship has also been found, in particular, with reference to mental health impacting on life satisfaction among youth. These studies have found that youth who have experienced trauma, anxiety and depression, among others, are less likely to report being satisfied with their lives in the absence of any clinical or social interventions to address their mental health. Of importance to this study, is the existing research which shows that education, employment, and support from fathers of their children are important indicators of happiness and life satisfaction among young mothers.

The study is subject to a few limitations. First, the issue of comorbidities, or more than one NCD, is not addressed. Respondents with more than one NCD were dropped from the analysis because of the sequential nature of the development of comorbidities. There is, however, a bias in dropping those with more than one NCD, but there were only two cases in the study and so the consequences have been minimal. Second the measure of social independence is made-up of only three measures: education, employment, and decision-making authority. There are many other measures that could be added to this variable but were not included because of non-response. The addition of these variables would have decreased the sample size and as it is, the sample for this study is fairly small. In addition to this, the data does not have any indicators of healthcare access or utilization. These variables would have been ideal to analyse and add to the social independence measure of the study.

An added strength of the current study is the use of the additive measure for social independence. As opposed to treating education, employment and decision-making authority as autonomous characteristics, this measure takes into account the strength of having all three as a measure of independence. Preliminary analysis, not included in the final study, showed no relationship between these autonomous measures and NCDs. Therefore, the additive measure is more useful.

A second strength of the study is the minimal loss to follow-up of the NIDS data. With only a few young females not being followed-up the strength and completeness of the data make the results reliable and plausible.

In conclusion, to reduce the likelihood of NCDs among young unmarried mothers, efforts to increase social independence need to be made. Results from this study show that the combined, additive measure of education, employment and decision-making authority, is important to reduce the likelihood of NCDs. Therefore, policies and programmes that autonomously address education and employment, need to bear in mind that these goals work together with decision-making authority to enable independence among young females. Also, healthcare policies and programmes that aim to reduce the incidence of NCDs among young people, should be aware of the social determinants of disease outcomes and not only focus on biomedical causes. Further research which examines the more indicators of independence such as household ownership and access to healthcare should be added to the social independence measure.
for a more holistic view of independence and its relationship to disease development among young people in developing countries.

Data availability
The researcher did not collect the data, nor does she own the data. The data from the National Income Dynamics Study (NIDS) as well as the survey materials are freely available by request from the Southern Africa Labour and Development Research Unit (SALDRU) at the University of Cape Town (UCT), South Africa. The request for data download can be found at http://www.nids.uct.ac.za/.

Acknowledgements
I would like to thank The Brown International University Advanced Research Institute (BIARI) and the Demography and Population Studies programme at the University of the Witwatersrand, Johannesburg, South Africa for financially supporting this research.

References


Open Peer Review

Current Peer Review Status:  ??

Version 1

Reviewer Report 26 July 2021

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Olusesan Ayodeji Makinde
Viable Knowledge Masters, Abuja, Nigeria

The research on single motherhood, social independence and non-communicable disease outcomes among young females in South Africa provides a new dimension in NCD research in single mothers. It attempts to link social independence and NCDs among a cohort of young women who were followed longitudinally across 10 years. It has great value due to the low loss to follow up amongst the starting cohort. It is certainly an innovative perspective to the research and can be useful as an advocacy tool for future policy and programming.

I however, identified some shortcomings in the paper that need further attention before moving forward. The paper, despite being a longitudinal study, does not provide evidence of causal analysis which is part of the objectives initially identified. Yes, there might be an association but causal inference is not obvious. It might be necessary to give some statements on this or to edit out the statement on causal relationship.

In addition, the regression analysis in table 3 has several shortcomings. The Odds Ratio presented is outside the range of the 95% confidence interval in several situations like life satisfaction, average social independence, social independence and others. This is a major shortcoming of this paper as a change in value after an update to the analysis might change the direction of discussion.

Although you assert that the 2 cases of co-morbidity you dropped is a small number, I think it is significant since the number that developed diabetes was only 10. This makes it 20% of the number you found. If there can be room for their inclusion, you might consider. However, if you feel strongly on need for their exclusion, that is also fine.

Minor grammatical issues on page 5: 'NCD with an odds ration of 1.41' and not 'NCD with and odds ration of 1.41'. Also on page 7: An added strength of the current study is the use of instead of 'used of'.

Is the work clearly and accurately presented and does it cite the current literature?
Partly

**Is the study design appropriate and is the work technically sound?**
Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**
Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**
Partly

**Are all the source data underlying the results available to ensure full reproducibility?**
Yes

**Are the conclusions drawn adequately supported by the results?**
Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Epidemiology, Health Information Systems, Disease Registries, NCDs, Gender

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.