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Suicide and poverty in low- and middle-income countries: a systematic review

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Suicide and poverty in low- and middle-income countries: a systematic review

Keywords: suicide, poverty, low- and middle-income countries, systematic review

Summary

Suicide is the 15th leading cause of death worldwide, with over 75% of suicides occurring in low- and middle-income countries where most of the world's poor live. Nonetheless, evidence on the relationship between suicide and poverty in low- and middle-income countries is limited. We conducted a systematic review to understand the relationship between suicidal ideations and behaviours (SIB) and economic poverty in low- and middle-income countries. We identified 37 studies meeting inclusion criteria. In 18 studies reporting the relationship between completed suicide and poverty, 31 relationships were explored. The majority reported a positive association. Of the 20 studies reporting on the relationship between non-fatal SIB and poverty, 36 relationships were explored. Again, the majority of studies reported a positive relationship. However, when considering each poverty dimension separately, we found substantial variations. Findings suggest a relatively consistent trend at the individual level indicating that poverty, particularly in the form of worse economic status, diminished wealth and unemployment is associated with SIB. At the country level, there are insufficient data to draw clear conclusions. Available evidence suggests potential benefits in addressing economic poverty within suicide prevention strategies, with attention to both chronic poverty and acute economic events.

Introduction

With over 800 000 people dying by suicide every year, suicide is the 15th leading cause of death worldwide.¹ Suicide is the second and fifth leading cause of death in young adults aged 15-29 and 30-49 years respectively, and surpasses maternal mortality as the leading cause of death among girls aged 15-19 globally.² While low- and middle-income countries (LMICs) have lower suicide rates compared to high-income countries (11.2 versus 12.7 per 100,000), 75.5% of suicides occur in LMICs.¹ Eight of the ten countries with the highest suicide rates in the world are LMICs.

Poverty, like suicide, is concentrated in LMICs.³ Poverty is a complex concept and its measurement is the subject of enduring debates.^{4,5} This lack of consensus is reflected by the wide array of indicators used to measure it, including 'absolute' measures (e.g. income), proxies (e.g. socio-economic status, employment, education, health, housing and living conditions, food insecurity), and composite indicators (e.g. Multidimensional Poverty Index, Human Development Index (HDI)).⁶

While relationships between poverty and mental health in LMICs are receiving increasing, although still inadequate, research attention,⁷⁻⁹ the evidence base for the association between suicide and poverty is concentrated in high-income countries. Sociological theories on the association between economic circumstances and suicide are longstanding,¹⁰ with evidence suggesting that a lifetime of poverty is protective, whereas a sudden downturn in material fortunes increases risk.^{11,12}

Economic and epidemiological theories of suicide have built on these ideas.¹³⁻¹⁵ At the individual level, it is well established that suicidal behaviour is associated with mental illness and individual personality factors,¹⁶⁻¹⁹ nonetheless the relationship between suicide and mental ill-health is complex. At the macro level, socio-cultural, economic and contextual factors also play a significant role in the aetiology of suicide,²⁰⁻²² such as a positive association between unemployment and completed suicide,²³ and between economic crises and suicide.²⁴

To date there has been no systematic review on the relationship between suicide and poverty across all LMICs. A previous review of common mental disorders and poverty in LMICs excluded suicide,⁷ while a review on suicide and poverty did not focus on LMICs,²⁵ and another focused on South and South-East Asia only.²⁶ It is within this context that we explore the association between suicide and poverty in LMICs.

Methodology

Preliminary mapping exercises on suicide and poverty in developing countries independently performed at the London School of Economics and Political Science and the University of Cape Town in 2010 informed the design of this systematic review.

Search strategy and selection criteria

We searched 11 medical and social science databases: CINAHL Plus, EconLit, EMBASE, Global Health, HTA Database, IBSS, MEDLINE, NHS EED, PsycINFO, PAIS International, and Web of Science. A search strategy was designed for PubMed combining keywords for suicide, poverty, and LMICs, and successively adapted for each database (see appendix). Searches were conducted for both published and unpublished studies with abstracts and full-texts in English only between January 2004 and April 2014. The initial mapping exercise indicated a paucity of studies with robust methodology before 2004. Snowballing and citation tracking of included studies in Google Scholar was also undertaken.

Reflecting the recent classification used by the World Health Organization,¹ we focused on the entire spectrum of suicidal ideations and behaviours (SIB), from suicidal ideations and plans, to suicidal gestures including self-harm, attempted suicide, and completed suicide. Studies focusing on assisted suicide or solely relating to violence, terrorism and war were excluded. In this paper we have used the term SIB to refer to the full spectrum of completed suicide, and non-fatal SIB including suicidal ideation, plan, attempt, and self-harm. All studies included in the review had explicit and clearly operationalised definitions of SIB.

Recognising the multidimensionality of poverty,^{4,6} we focused on economic poverty indicators at the individual level (absolute poverty, relative poverty, economic status, wealth, unemployment, economic or financial problems, debt, welfare support) and country level (national income, national level

inequalities, composite poverty measures).²⁷ We excluded studies defining poverty through non-economic indicators (e.g. education, health, housing and living conditions, food insecurity).

The World Bank's definition of LMICs was used (see appendix).²⁸ We included the following study designs: randomised, quasi-randomised and non-randomised controlled trials, before-and-after studies, interrupted-time series, cohort studies, case-control studies, cross-sectional studies, ecological studies, case report/case series, as well as economic evaluation and economic modelling studies. Where a study included mixed (quantitative and qualitative) methods, we included the quantitative evidence only. Studies had to include at least one internal comparison group of individuals, allowing analysis by economic status. Studies also had to report quantitative data on measures of poverty and SIB and their relationship, testing the association between SIB and poverty using bivariate or multivariate analysis. We excluded studies using descriptive statistics only.

One author (VI) ran the literature search strategy. After testing agreement over a sample of 100 studies, two authors (BS, JB) independently double screened title and abstracts against the inclusion and exclusion criteria. Full-texts of included studies were retrieved. After testing agreement with a random sample of 10 studies, three authors (AP, BS, VI) independently double screened full-text against the inclusion and exclusion criteria. Disagreements during the screening were discussed and a third author consulted if needed. Additional searches tracking citations and looking at references of included studies were performed by two authors (BS, VI). The screening was performed in EndNote and Zotero.

Data extraction and quality assessment

Authors (AP, BS, CL, JB, TL, VI) double-extracted data from the eligible studies including: study characteristics (author, year of publication, country of study, setting, study population, study design, sample size, type of analysis); SIB dimensions; poverty dimensions; relationship between SIB and poverty (methods of statistical analysis, nature of association found). Authors were contacted when data were not reported in order to obtain further information. We differentiated between completed suicide and non-fatal SIB.

Authors (BS, EB, JB, VI) independently assessed the quality of eligible studies using the published Scottish Intercollegiate Guidelines Network checklist²⁹ for cohort studies and case-control studies, adapted for cross-sectional, interrupted-time series, ecological and economic studies (Table 1). Data extraction and quality assessment were performed in Excel.

<Table 1>

Data analysis

Narrative analysis was used. Characteristics of each study and associations between SIB and poverty were described. We stratified studies by poverty and suicide dimensions, and method of statistical analysis. We then calculated the number of studies with positive, null, negative, and unclear associations between SIB and poverty. To avoid over or under-counting, the unit of analysis was the study rather than the article. Meta-analysis was not possible due to the heterogeneity of studies.

Results

In the initial search we identified 3653 records (Figure 1). After discarding 1544 duplicates, we screened 2109 unique records by title and abstract. 188 full-text articles were retrieved with 37 meeting our inclusion criteria. Characteristics of the 37 studies are described in Table 2 and reported in full in appendix. Of the 151 studies excluded at full text screening, one was not located, 14 were in a language other than English, 29 did not meet inclusion criteria for poverty, 20 took place in high-income countries, 22 did not investigate the relationship between SIB and poverty, 47 did not use bivariate or multivariate analysis, and 18 did not meet study design inclusion criteria.

<Figure 1>

<Table 2>

Meta-analysis was not possible because of the heterogeneity of measures of SIB and poverty, and statistical methods of analysis. The only possible outcomes that could have been assessed in this way were employment and wealth, but they were measured differently and used in bivariate analysis only, which would not have allowed meaningful analysis.

We assessed 29 (78%) studies to be of high³⁰⁻⁴³ or acceptable⁴⁴⁻⁵⁸ quality (Table 3). Eight studies⁵⁹⁻⁶⁶ were of low quality due to problems with risk of bias: performance, attrition and detection bias (interrupted-time series); selection bias, unclear case definitions, detection bias, lack of adjustment for confounding factors (case-control studies); detection bias, lack of adjustment for confounding factors (cross sectional and ecological studies).

<Table 3>

Table 4 summarises the relationships between SIB and poverty reported in 37 included studies (full details in appendix). In 18 studies reporting the relationship between completed suicide and poverty, including one study reporting on both suicide dimensions, 31 relationships were explored. The majority of bivariate analyses were positive, indicating increased completed suicide with increased poverty: 9 of 16 (56%). However a minority of multivariate analyses were positive: 5 of 15 (33%). A minority of studies reported a null association using bivariate analyses: 4 of 16 (25%), but about half reported a null association in multivariate analyses: 7 of 15 (47%). Only one study reported a negative association through bivariate analysis. Of the 20 studies reporting on the relationship between non-fatal SIB and poverty, including one study reporting on both suicide dimensions, 36 relationships were explored. The majority of them were positive, indicating increased non-fatal SIB were associated with increased poverty: 12 of 22 (55%) using bivariate and 9 of 14 (64%) using multivariate analysis. A lower number were null: 9 of 22 (41%) using bivariate and 5 of 14 (36%) using multivariate analysis. No study reported a negative association using multivariate analysis. However, when considering each poverty dimension separately, we found substantial variations.

<Table 4>

Absolute and relative poverty

No study investigated the relationship between SIB and absolute poverty. One study⁴⁹ from Belarus found a positive association between completed suicide and relative poverty (beta=0.3 SE=0.0 for males, $\beta=0.03$ SE=0.0 for females) through multivariate analysis. Another study³² testing the association between non-fatal SIB and relative poverty reported a positive association with 12-month suicidal ideations (OR=1.5, 95% CI 1.2-2.0) and plans (OR=1.7, 95% CI 1.1-2.7) but a null association for 12-month planned and unplanned suicide attempts in multiple countries using data from the World Mental Health Survey. Only bivariate analyses were performed in these studies.

Economic status and wealth

Sixteen studies explored the relationship between SIB and economic status or wealth. Five studies^{36,38,56,61,63} focused on completed suicide. Two^{36,63} reported positive and two^{38,56} null associations when using bivariate analysis. However, where multivariate analysis was performed in two Indian studies, only null associations were found for value of livestock and value of agricultural produce amongst farmers⁶¹ and for monthly household income.⁵⁶

Of the eleven studies on non-fatal SIB, six^{35,41,42,48,57,65} using bivariate analysis reported a positive association and four^{37,55,57,58} a null association. However, all studies^{34,37,38,41,48,57,64} performing multivariate analysis found a positive association except one³⁴ which found a null association between perceived financial status and suicide attempts in China. In Chinese studies, financial status was associated with suicidal ideation (OR=2.93, 95% CI 1.82-4.71), severe suicidal ideation (OR=2.25, 95% CI 1.21-4.19) and suicide plan (OR=2.15, 95% CI 1.04-4.41),³⁴ family economic status was associated with six-month prevalence of severe suicidal ideation (OR=1.52, 95% CI 1.07-2.15),⁴⁸ and monthly income was associated with lifetime prevalence of suicidal attempts (OR=0.2, 95% CI 0.06-0.6).³⁷ In India, perceived economic status was associated with 12-month prevalence of suicidal ideation (OR=2.23, 95% CI 1.62-3.06) and suicide attempt (OR=2.92, 95% CI 1.63-5.21).⁶⁴ In Vietnam, low income was associated with lifetime prevalence of suicidal ideation (OR=1.7, 95% CI 1.1-2.6).⁴¹ In Turkey, low income was associated with life-time prevalence of self-harm (OR=2.10, 95% CI 1.07-4.12).⁵⁷

Unemployment

Thirteen studies investigated the relationship between SIB and unemployment. Six^{31,38,49,51,59,62} focused on completed suicide and six^{30,32,39,41,46,54} on non-fatal SIB, with one⁵² looking at both dimensions. Among the seven studies reporting on completed suicide, three^{31,51,62} reported a positive and one³⁸ a

null association between completed suicide and unemployment using bivariate analysis. Results were mixed when studies used multivariate analysis, with one⁵⁹ showing a positive association with female low labour force participation in Iran ($r=-0.38$), one⁵² reporting null association with unemployment rates amongst the working age population in Sri Lanka (IRR=1.29, 95% CI 0.96–1.72), and another⁴⁹ unclear association with unemployment rates amongst men and women in Belarus.

Among the seven studies investigating non-fatal SIB, results were mixed for studies using bivariate analysis, with three^{32,46,54} showing positive and three^{32,41,46} null associations. When multivariate analysis was performed, only one Iranian study⁵⁴ reported a positive association between unemployment rates and suicide attempts (OR=2.54, 95% CI 1.08–5.98). Three studies reported a null association with unemployment and hospital admission following intentional self-burning³⁰ and self-reported responses to the Harmful Behaviour Scale and the Beck Scale for Suicidal Ideation⁴⁶ both in Iran, as well for hospital admissions for suicide attempts in Sri Lanka.⁵²

Economic or financial problems

Seven studies explored the relationship between suicide and economic or financial problems. All three studies focusing on completed suicide used bivariate analysis only, reporting one⁵¹ positive, one³⁸ null, and one⁶² unclear association. Amongst the four^{32,43,50,53} studies on non-fatal SIB, one⁴³ showed positive and one³² a null association using bivariate analyses. When multivariate analyses were performed, the results were similar with two studies reporting positive associations between non-fatal SIB and economic or financial problems. One study⁵³ reported a positive association between the perceived level of stress due to economic circumstances and lifetime suicidal ideation (OR=1.17, 95% CI 1.11–1.24) or lifetime suicidal attempt (OR=1.19, 95% CI 1.08–1.31) in India. A similar association was shown between becoming a female sex worker due to financial necessity and six-month prevalence of suicidal attempts among female sex workers in China (OR=0.24, 95% CI 0.09–0.58).⁵⁰ A null association was shown between financial burden for managing the autoimmune disorder, lupus, and suicidal ideation in China.⁴³

Debt and welfare support

Three studies investigated the relationship between debt and completed suicide. While results were positive for the two^{62,63} studies performing bivariate analysis, there was a null association in a study⁶¹ looking at farmers in India when multivariate analysis was used. One study⁵⁹ explored the relationship between welfare support and completed suicide. Multivariate analysis found a positive association between completed suicide and women receiving welfare support ($r=-0.58$) in Iran.

Economic crisis, national income, and national level inequalities

No study explored the relationship between SIB and economic crises or national level inequalities. However, seven studies^{33,40,44,45,47,60,66} investigated the relationship between suicide and national income. Three studies using bivariate analysis had mixed results: one³³ positive with the inflation rate in South Africa, one⁴⁵ negative with Purchasing Power Parity-adjusted GDP per capita across multiple countries, and one⁶⁰ unclear association with GDP per capita in Brazil. When multivariate analyses were performed, results continued to be mixed with two positive associations with per capita real income in Turkey (long-run elasticity of suicide with respect to income -0.41)⁴⁴ and with per capita GDP adjusted for inflation in urban (beta=-0.57, SE=0.20) and also in rural China (beta=-0.68, SE=0.06).⁶⁶ One⁴⁷ null association with per capita GDP in Brazil, and two unclear associations with the inflation rate in South Africa³³ and with GDP per capita in India⁴⁰ were found.

Composite poverty measure

One study⁴⁷ explored the relationship between suicide and composite poverty measures. Using multivariate analysis this Brazilian study reported a null association between suicides and the income domain of the HDI (HDI-income).

Discussion

The results of our review show that 8 of 13 individual level studies (62%) reported a positive association between economic adversity using a variety of poverty measures and completed suicide in bivariate analyses. However, this relationship became more attenuated in multivariate analysis. In the case of non-fatal SIB, both bivariate and multivariate analyses showed that approximately 60% of studies reported a positive association with poverty. The remaining studies showed a null or unclear relationship, with very few showing a negative relationship. We found a small number of studies in

some poverty dimensions, mainly at the individual level, with no evidence for some dimensions (absolute poverty, economic crisis, and national level inequalities).

At the individual level, a broad trend is that adverse economic status, as measured through a variety of poverty indicators, appears to increase risk for SIB in LMICs. However, the relationship between poverty and SIB in LMICs is complex. Firstly, the 'effect' of poverty on risk of SIB appears to attenuate when multivariate analyses are conducted and other distal and proximal variables are controlled for, particularly in the case of completed suicide. This trend was not evident in non-fatal SIB, where both bivariate and multivariate analyses showed relatively consistent trends.

Secondly, the findings for individual and country-level studies were quite different. Whereas there were relatively consistent associations between poverty and risk of SIB for individuals, there were no such trends at country level. This may indicate that at a country level a variety of confounding variables acting either within or between the comparison groups may not be accounted for in the study design. Currently the evidence on country level data is relatively thin and insufficient to draw clear conclusions regarding the effect of macro level economic variables on suicide.

Thirdly, relatively few dimensions of poverty are assessed in these studies; only six individual-level and two country-level dimensions of poverty receive attention. Poverty dimensions such as unemployment and economic status receive comparatively more attention, while less attention is paid to debt and welfare support. Most studies used objective indicators of poverty (e.g. mean family income, loans) and relied on self-report or family-report measures. Few studies considered the subjective experience of poverty.

Fourthly, variations in the relationship between suicide and poverty may also reflect varying measures of suicide employed in studies. Suicidology research has long been hampered by problems inherent in defining and measuring SIB and the lack of consistent use of terminology.⁶⁷ These problems manifest in the inconsistency with which suicidal phenomena have been defined and measured in included studies. In some, for example, suicidal ideation is defined as 'thoughts of killing oneself'⁴³ while others define the same concept as 'a spectrum of self-destructive thoughts or ideas'.³⁹ Some studies focus on very particular kinds of non-fatal SIB (e.g. burning oneself) while others have broader inclusion criteria (e.g. self-harm). A further problem confounding the interpretation of findings and making comparisons difficult is under-reporting of SIB in some LMICs as a result of poor surveillance systems, stigma and legal sanctions.

Fifthly, different poverty dimensions vary in the strength and consistency of their associations with SIB. For example, while relatively consistent associations were evident for economic status, wealth and unemployment, the findings were more mixed for debt, welfare support, and relative poverty. This may be partially due to limited evidence in some of these latter domains. In addition, there may be varying effects of chronic and acute poverty on SIB. Whereas chronic poverty may provide a set of distal economic risk factors for SIB, acute economic shocks, such as crop failure,^{61,63} may provide more immediate precipitants, which interact with family and individual variables to increase risk for SIB. A previous systematic review²⁶ found a similar complex picture, with lower levels of socio-economic position being associated with an increased risk of completed suicide and suicide attempts in South and South-East Asia, with variation across dimensions and studies.

Sixth, the evidence was weak on whether the relationship between SIB and poverty is due to either social causation or social selection. The only longitudinal study of acceptable quality included in this systematic review used economic status as a confounder and found no significant association between low economic status and completed suicide.⁵⁶ A previous review⁷ exploring the association between poverty and common mental disorders revealed a similarly complex picture in which a variety of poverty and mental health related variables interact in a complex manner, influenced by both population and measurement factors.

Seventh, both SIB and poverty differ by sex. Globally, suicides rates are slightly less than double¹ for men compared to females, while economic poverty is more common in women.⁶⁸ However, gender differences in the relationship between SIB and poverty was not explored due to the limited evidence. Three studies^{33,47,49} only explored relationships for both female and male participants.

Finally, social factors relating to poverty, such as rurality and access to lethal means, may explain some of the findings. Living in conditions of poverty may influence access to potentially fatal means of self-injury and may thus influence the rates of suicide. However, those relationships were not explored in the included studies. One study³⁴ reporting positive association between non-fatal SIB (suicidal ideation, severe suicidal ideation, suicide plan) and financial status in rural China, reported a positive association between non-fatal SIB (suicidal ideation, severe suicidal ideation) and degree of rurality using multivariate analysis. Another study⁵² conducted amongst completed suicide and suicidal attempters by self-poisoning in rural Sri Lanka, where about 60% of the suicides were due to self-poisoning,⁶⁹ found null association between unemployment and both completed suicide and suicidal attempts, but positive association with being employed in agriculture (with easier access to lethal means) using multivariate analysis.

This is the first systematic review to our knowledge to explore the association between SIB and poverty in LMICs. The inclusion of both fatal and non-fatal SIB provided an exploration of the entire spectrum of possible suicidal phenomena. However, the study has limitations. First, poverty was defined in economic terms only, not including other dimensions of poverty such as poor education, health, housing and living conditions, and food insecurity.⁴ Poverty is increasingly understood by researchers to be more than simply a lack of resource or income, and can include cultural, social, and environmental dimensions, such as shame⁷⁰ and religious beliefs.⁶⁵ Second, publication bias may have hindered the results, with studies reporting negative and null results being less likely to be published. Third, the exclusion of qualitative studies may have limited understanding of how the experience of poverty may be related to SIB, and the role of cultural, social and environmental factors. Fourth, searches were only run in English and only English full texts were included. Fifth, searches were limited to 2004–2014.

Suicide carries not only a considerable burden of disease but a substantial cost, mainly due to high levels often seen in young adulthood and the associated loss in productivity. While the evidence in LMICs is scarce, in high-income countries the mean cost per suicide has been estimated to range from \$0.4 million to \$4.3 million (all values expressed in international dollars, 2014), dependent on types of costs included and methodology.⁷¹ The Sustainable Development Goals not only have included the goal to reduce by 2030 premature mortality by a third 'from non-communicable diseases through prevention and treatment' but also to 'promote mental health and well-being'.⁷² The WHO mental health action plan 2013–2020 has also set the goal of a 10% reduction in suicide by 2020⁷³ through the use of effective interventions (e.g. reduced access to pesticides, training programmes for school teachers, follow up of suicide attempt survivors).⁷⁴ These actions need not only to involve health but also other sectors.¹ Our results suggest that interventions addressing the poverty of individuals may potentially have a positive impact on reducing SIB. Attention needs to be brought not only to chronic poverty but also to acute events and economic shocks, such as crop failure. However, no recommendations may be made for country level factors as the evidence is still too limited.

Further research is needed to understand associations between different dimensions of suicide and poverty, and to cover all regions, especially regions where suicide rates are high. Additional studies should use multivariate analysis to highlight associations and interactions with proximal and distal factors and have longitudinal study designs to explore causal pathways. In doing this, encouraging a more consistent statistical approach towards analysis would also help in facilitating meta-analyses and cross-country comparisons. While most of the studies in this review were also a-theoretical, it would be helpful if future studies in this field made use of appropriate existing theoretical frameworks and contributed to their adaptation to help understand the aetiology of suicide and how poverty is implicated in LMICs settings.

Contributors: VI coordinated the review; designed and undertook the searches; contributed to the screening, quality assessment and data extraction; analysed the data; contributed to the interpretation of data; wrote the first draft. JB contributed to the screening, quality assessment and data extraction; contributed to the interpretation of data; assisted with the writing of the first draft. AP, BS, and KC contributed to the screening, quality assessment and data extraction; contributed to the interpretation of data; critically revised the manuscript. CL and TL provided advice; contributed to the data extraction; contributed to the interpretation of data; critically revised the manuscript. EC and DMD provided advice; contributed to the interpretation of data; critically revised the manuscript.

Conflict of interest: We declare that we have no conflicts of interest.

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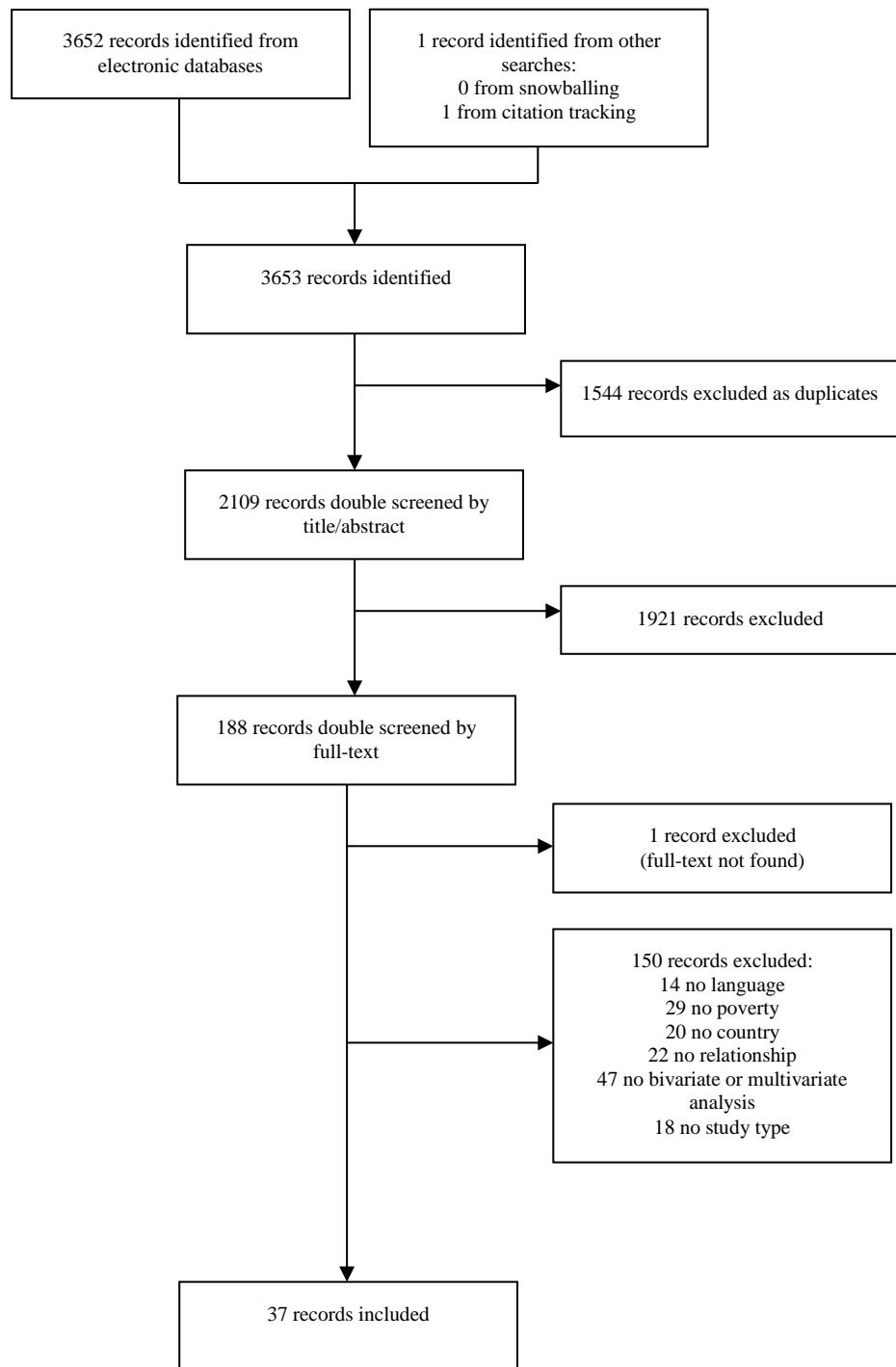


Figure 1: Search process

Tables

<i>Study designs</i>	<i>Criteria</i>
All study designs	Appropriate research question, valid results, generalisable results.
Interrupted-time series; Cohort study	Comparable baseline, participation rate, outcome presents at baseline, losses to follow-up, impact of losses to follow-up, clearly defined outcomes, blind outcome assessment, acknowledgment of impact of non-blind assessment, reliable exposure assessment, validity of outcome assessment, validity of exposure measure, identification of potential confounders and confidence intervals, use of control group ^a .
Case-control study	Comparable case and controls, same exclusion criteria, participation rate, similarities at baselines, clear case and control definitions, blind outcome assessment, reliability of exposure measure, identification of potential confounders and confidence intervals.
Cross-sectional study	Participation rate, clearly defined outcomes, validity and reliability of exposure and outcome measures, identification of potential confounders and confidence intervals.
Ecological study	Participation rate, clearly defined outcomes, validity and reliability of exposure and outcome measures, identification of potential confounders within and between areas, and confidence intervals.
Economic modelling	Economic importance, justified study design, appropriate model type, inclusion of relevant economic and social factors, appropriate outcomes, description of datasets, impact of losses of follow-up, discounting, clearly stated assumptions and sensitivity analysis.
Overall ratings	
High quality	The majority of criteria are met with little or no risk of bias.
Acceptable quality	The majority of criteria are met with some risk of bias.
Low quality	The majority of criteria are not met with significant risk of bias.

Note: ^a Use of control group was assessed for interrupted-time series only.

Table 1: Study quality assessment criteria

	<i>No. of studies</i>	<i>%</i>
WHO region^a		
AFRO	3 ^{33,35,39}	8%
AMRO	2 ^{47,60}	5%
EMRO	5 ^{30,46,51,54,59}	14%
EURO	6 ^{31,44,49,55,57,58}	16%
SEARO	9 ^{38,40,52,53,56,61-64}	24%
WPRO	10 ^{34,36,37,41-43,48,50,65,66}	27%
Multiple	2 ^{32,45}	5%
World Bank income group^b		
LIC	2 ^{35,39}	5%
LMC	9 ^{38,40,41,51-53,56,62,64}	24%
UMC	24 ^{30,31,33,34,36,37,42-44,46-50,54,55,57-61,63,65,66}	65%
Multiple	2 ^{32,45}	5%
Setting		
Community-based	28 ^{33-41,44,45,47-51,53-57,59-64,66}	76%
Hospital based	5 ^{30,43,46,52,65}	14%
Others	3 ^{32,42,58}	8%
n/a	1 ³¹	3%
Location		
Rural	10 ^{34,35,38,39,48,50,52,56,61,63}	27%
Urban	9 ^{31,41,42,53-55,59,62,65}	24%
Both	14 ^{30,32,33,36,37,40,44,45,49,57,58,60,64,66}	38%
Other	1 ⁴⁷	3%
n/a	3 ^{43,46,51}	8%
Study design		
Randomised controlled trial	0	0%
Quasi-randomised controlled trial	0	0%
Non-randomised controlled trials	0	0%
Before-after studies	0	0%
Interrupted-time series	3 ^{45,60,66}	8%
Cohort studies	1 ⁵⁶	3%
Case-control studies	8 ^{30,31,36,38,51,62,63,65}	22%
Cross-sectional studies	18 ^{32,34,35,37,39,41-43,46,48,50,53-55,57,58,61,64}	49%
Case report/case series	0	0%
Ecological studies	4 ^{47,49,52,59}	11%
Economic evaluation	0	0%
Economic modelling	3 ^{33,40,44}	8%
Gender		
Female (%) ^c		55%
Poverty dimension		
Absolute poverty	0	0%
Relative poverty	2 ^{32,49}	5%
Economic status and wealth assets	16 ^{34-38,41,42,48,55-58,61,63,65}	43%
Unemployment	13 ^{30,31,32,38,39,41,46,49,51,52,54,59,62}	35%
Economic/financial problems	7 ^{32,38,43,50,51,53,62}	19%
Debt	3 ⁶¹⁻⁶³	8%
Support from the welfare system	1 ⁵⁹	3%
Economic crisis	0	0%
National income	7 ^{33,40,44,45,47,60,66}	19%
National level inequalities	0	0%
Composite poverty measure	1 ⁴⁷	3%
Suicide dimension		
Completed suicide	17 ^{31,33,36,38,40,44,45,47,49,51,56,59-63,66}	46%
Non-fatal SIB	19 ^{30,32,34,35,37,39,41-43,46,48,50,53-55,57,58,64,65}	51%
Both	1 ⁵²	3%

Note: ^a WHO regions: Americas (AMRO), African region (AFRO), Eastern Mediterranean region (EMRO), European region (EURO), South-East Asia region (SEARO), and the Western Pacific region (WPRO). ^b World Bank income groups: low-income country (LIC), lower middle-income country (LMC), and upper middle-income country (UMC). ^c Percentage of female in included studies. SIB Suicidal Ideations and Behaviours. n/a not available.

Table 2: Study characteristics

	<i>Low quality</i>	<i>Acceptable quality</i>	<i>High quality</i>	<i>Total studies</i>
Interrupted-time series	2 ^{60,66}	1 ⁴⁵	0	3
Cohort study	0	1 ⁵⁶	0	1
Case-control study	3 ^{62,63,65}	1 ⁵¹	4 ^{30,31,36,38}	8
Cross-sectional study	2 ^{61,64}	8 ^{46,48,50,53-55,57,58}	8 ^{32,34,35,37,39,41-43}	18
Ecological study	1 ⁵⁹	3 ^{47,49,52}	0	4
Economic modelling	0	1 ⁴⁴	2 ^{33,40}	3
TOTAL	8 (22%)	15 (41%)	14 (38%)	37

Table 3: Study quality

<i>Poverty dimension</i>	<i>Suicide dimension</i>	<i>Analysis</i>	<i>Association between poverty and suicide</i>				<i>Total</i>
			<i>Positive</i>	<i>Negative</i>	<i>Null</i>	<i>Unclear</i>	
Individual level							
Absolute poverty	Fatal	Bivariate	0	0	0	0	0
		Multivariate	0	0	0	0	0
	Non-fatal	Bivariate	0	0	0	0	0
		Multivariate	0	0	0	0	0
Relative poverty	Fatal	Bivariate	0	0	0	0	0
		Multivariate	1 ⁴⁹	0	0	0	1
		Bivariate	1 ³²	0	1 ³²	0	2
	Non-fatal	Multivariate	0	0	0	0	0
		Bivariate	2 ^{36,63}	0	2 ^{38,56}	0	4
		Multivariate	0	0	3 ^{56,61}	0	3
Economic status and wealth assets	Non-fatal	Bivariate	6 ^{35,41,42,48,57,65}	0	4 ^{37,55,57,58}	0	10
		Multivariate	6 ^{34,37,41,48,57,64}	0	1 ³⁴	0	7
		Bivariate	3 ^{31,51,62}	0	1 ³⁸	0	4
Unemployment	Fatal	Multivariate	1 ⁵⁹	0	1 ⁵²	1 ⁴⁹	3
		Bivariate	3 ^{32,46,54}	0	3 ^{32,41,46}	1 ³⁹	7
		Multivariate	1 ⁵⁴	0	3 ^{30,46,52}	0	4
Economic or financial problems	Fatal	Bivariate	1 ⁵¹	0	1 ³⁸	1 ⁶²	3
		Multivariate	0	0	0	0	0
		Bivariate	2 ⁴³	0	1 ³³	0	3
Debt	Non-fatal	Multivariate	2 ^{53,50}	0	1 ⁴³	0	3
		Bivariate	2 ^{62,63}	0	0	0	2
		Multivariate	0	0	1 ⁶¹	0	1
Welfare support	Fatal	Bivariate	0	0	0	0	0
		Multivariate	1 ⁵⁹	0	0	0	1
		Bivariate	0	0	0	0	0
	Non-fatal	Multivariate	0	0	0	0	0
		Bivariate	0	0	0	0	0
		Multivariate	0	0	0	0	0
<i>Sub-total: Individual level</i>	<i>Fatal</i>	<i>Bivariate</i>	8	0	4	1	13
		<i>Multivariate</i>	3	0	5	1	9
		<i>Non-fatal</i>	12	0	9	1	22
	<i>Non-fatal</i>	<i>Bivariate</i>	9	0	5	0	14
		<i>Multivariate</i>					
Country level							
Economic crisis	Fatal	Bivariate	0	0	0	0	0
		Multivariate	0	0	0	0	0
	Non-fatal	Bivariate	0	0	0	0	0
		Multivariate	0	0	0	0	0
National income	Fatal	Bivariate	1 ³³	1 ⁴⁵	0	1 ⁶⁰	3
		Multivariate	2 ^{44,66}	0	1 ⁴⁷	2 ^{33,40}	5
		Bivariate	0	0	0	0	0
National level inequalities	Non-fatal	Multivariate	0	0	0	0	0
		Bivariate	0	0	0	0	0
		Multivariate	0	0	0	0	0
Composite poverty measure	Fatal	Bivariate	0	0	0	0	0
		Multivariate	0	0	1 ⁴⁷	0	1
		Bivariate	0	0	0	0	0
	Non-fatal	Multivariate	0	0	0	0	0
		Bivariate	0	0	0	0	0
		Multivariate	0	0	0	0	0
<i>Sub-total: Country level</i>	<i>Fatal</i>	<i>Bivariate</i>	1	1	0	1	3
		<i>Multivariate</i>	2	0	2	2	6
		<i>Non-fatal</i>	0	0	0	0	0
	<i>Non-fatal</i>	<i>Bivariate</i>	0	0	0	0	0
		<i>Multivariate</i>	0	0	0	0	0
Total	Fatal	Bivariate	9	1	4	2	16
		Multivariate	5	0	7	3	15
		Non-fatal	12	0	9	1	22
	Non-fatal	Bivariate	9	0	5	0	14
		Multivariate					

Note: Fatal refers to completed suicide. Non-fatal includes all remaining suicidal ideations and behaviours: ideation, plan, attempt, and self-harm.

Table 4: Positive, negative, null and unclear associations between poverty and SIB, by suicide dimension