



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

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*Lancet Psychiatry* 2016;  
3: 774–83

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Suicide is the 15th leading cause of death worldwide, with over 75% of suicides occurring in low-income and middle-income countries. Nonetheless, evidence on the association between suicide and poverty in low-income and middle-income countries is scarce. We did a systematic review to understand the association between suicidal ideations and behaviours and economic poverty in low-income and middle-income countries. We included studies testing the association between suicidal ideations and behaviours and economic poverty in low-income and middle-income countries using bivariate or multivariate analysis and published in English between January, 2004, and April, 2014. We identified 37 studies meeting these inclusion criteria. In 18 studies reporting the association between completed suicide and poverty, 31 associations were explored. The majority reported a positive association. Of the 20 studies reporting on the relationship between non-fatal suicidal ideations and behaviours and poverty, 36 associations were explored. Again, almost all studies reported a positive association. However, when considering each poverty dimension separately, we found substantial variations. These findings show a consistent trend at the individual level indicating that poverty, particularly in the form of worse economic status, diminished wealth, and unemployment is associated with suicidal ideations and behaviours. At the country level, there are insufficient data to draw clear conclusions. Available data show a potential benefit in addressing economic poverty within suicide prevention strategies, with particular 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.<sup>1</sup> Suicide is the second leading cause of death in young adults aged 15–29 years and fifth leading cause in those aged 30–49 years. Suicide surpasses maternal mortality as the leading cause of death among girls aged 15–19 years worldwide.<sup>2</sup> Although prevalence of suicide in low-income and middle-income countries is lower than in high-income countries (11.2 vs 12.7 per 100 000 people), 75.5% of deaths by suicide occur in low-income and middle-income countries.<sup>1</sup> Eight of the ten countries with the highest prevalence of suicide in the world are low-income and middle-income countries.

Poverty, like suicide, is concentrated in low-income and middle-income countries.<sup>3</sup> Poverty is a complex concept and its measurement is the subject of enduring debates.<sup>4,5</sup> The need for consensus is reflected by the use of a wide array of indicators to measure poverty, including absolute measures (eg, income), proxies (eg, socioeconomic status, employment, education, health, housing and living conditions, food insecurity), and composite indicators (eg, Multidimensional Poverty Index, Human Development Index [HDI]).<sup>6</sup>

Although associations between poverty and mental health in low-income and middle-income countries are receiving steadily increasing research attention,<sup>7–9</sup> 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 long standing,<sup>10</sup> with evidence suggesting that a lifetime of poverty is protective, whereas a sudden downturn in material fortunes can increase risk of suicide.<sup>11,12</sup>

Economic and epidemiological theories of suicide have built on these ideas.<sup>13–15</sup> At the individual level, suicidal behaviour has been associated with mental illness and individual personality factors;<sup>16–19</sup> nonetheless the relation between suicide and poor mental health is complex. At the population level, sociocultural, economic, and contextual factors also play a substantial role in the cause of suicide,<sup>20–22</sup> such as a positive association between unemployment and completed suicide,<sup>23</sup> and between economic crises and suicide.<sup>24</sup>

No systematic review has been done on the association between suicide and poverty across all low-income and middle-income countries to date. A previous review<sup>7</sup> of common mental disorders and poverty in low-income and middle-income countries excluded suicide; a review<sup>25</sup> on suicide and poverty did not focus on low-income and middle-income countries; and another<sup>26</sup> focused on south and southeast Asia only. It is within this context that we explore the association between suicide and poverty in low-income and middle-income countries.

## Search strategy and selection criteria

Preliminary mapping exercises on suicide and poverty in low-income and middle-income countries were done independently at the London School of Economics and Political Science (UK) and the University of Cape Town (South Africa) in 2010, which informed the design of this systematic review.

We searched 11 medical and social science databases: CINAHL Plus, EconLit, Embase, Global Health, HTA Database, IBSS, NHS EED, PsycINFO, PAIS International, and Web of Science. A search strategy was designed for PubMed combining keywords for suicide, poverty, and low-income and middle-income countries, and successively adapted for each database (appendix).

See Online for appendix

We searched 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 few studies with robust methods before 2004. We ran additional searches tracking citations and looking at references of included studies.

Reflecting the classification used by WHO in 2014,<sup>1</sup> we focused on the entire spectrum of suicidal ideations and behaviours, 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 Review, we have used the term “suicidal ideations and behaviours” to refer to the full spectrum of completed suicide, and non-fatal suicidal ideations and behaviours including suicidal ideation, plan, attempt, and self-harm. All studies included in the Review had explicit and clearly defined suicidal ideations and behaviours.

Recognising the multidimensionality of poverty,<sup>4,6</sup> 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).<sup>27</sup> We excluded studies defining poverty through non-economic indicators (eg, education, health, housing and living conditions, food insecurity).

We used the World Bank’s definition of low-income and middle-income countries throughout this report (appendix).<sup>28</sup> 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 reports, case series, and economic evaluation and economic modelling studies. If a study included mixed (quantitative and qualitative) methods, we included the quantitative data 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 suicidal ideations and behaviours and their relationship, testing the association between suicidal ideations and behaviours 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 and JB) independently screened the same titles and abstracts against the inclusion and exclusion criteria. They were not allowed to communicate or share their data during the process. Full texts of included studies were retrieved and the same fulltext references independently screened by two authors (AP and BS). The results were sent to VI, who compared results and compiled a list of studies for which they reached a different conclusion. BS and JB discussed these until reaching an agreement. The studies for which agreement could not be reached were discussed by BS and JB with a third author. Additional searches were done by two authors (BS and VI). We used EndNote and Zotero software for screening.

### Data extraction and quality assessment

Authors (AP, BS, CL, JB, TL, and VI) extracted data from the eligible studies including: study characteristics (author, year of publication, country of study, setting, study population, study design, sample size, and type of

| Criteria   |  |
|--|--|
| <b>Study designs</b>   |  |
| 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, and use of control group* |
| Case-control study   | Comparable case and controls, same exclusion criteria, participation rate, similarities at baseline, clear case and control definitions, blind outcome assessment, reliability of exposure measure, and identification of potential confounders and confidence intervals   |
| Cross-sectional study  | Participation rate, clearly defined outcomes, validity and reliability of exposure and outcome measures, and identification of potential confounders and confidence intervals  |
| Ecological study   | Participation rate, clearly defined outcomes, validity and reliability of exposure and outcome measures, and 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  |
| <b>Overall ratings</b>   |  |
| 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   |
| *Use of control group was assessed for interrupted-time series only. |  |
| <b>Table 1: Study quality assessment criteria</b>                    |  |

analysis), suicidal ideations and behaviours dimensions, poverty dimensions, association between suicidal ideations and behaviours and poverty (methods of statistical analysis and nature of association found). Data was verified by a second author, and then checked for statistical accuracy (CL or TL). We contacted authors when data were not reported to obtain further information. We differentiated between completed suicide and non-fatal suicidal ideations and behaviours.

Authors (BS, EC, JB, and VI) independently assessed the quality of eligible studies using the published Scottish Intercollegiate Guidelines Network checklist<sup>29</sup> 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 done in Excel.

### Data analysis

We used a narrative analysis for these data. Characteristics of each study and associations between suicidal ideations and behaviours and poverty were

described. We stratified studies by poverty and suicide dimensions, and by the method of statistical analysis. We then calculated the number of studies with positive, null, negative, and unclear associations between suicidal ideations and behaviours and poverty. To avoid attributing too much or too little weight to an individual study, the unit of analysis was the study rather than the article to avoid bias towards studies that had produced more than one paper. We described results from bivariate and multivariate analyses separately to highlight when other distal and proximal variables were controlled for. Meta-analysis was not possible because of the heterogeneity of measures of suicidal ideations and behaviours 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 a meaningful analysis.

### Identification of studies

In the initial search we identified 3653 records (figure). After discarding 1544 duplicates, we screened 2109 unique records by title and abstract. 188 full articles were retrieved of which 37 met our inclusion criteria. Characteristics of the 37 studies are described in table 2 and reported in full in the appendix.

We considered 29 (78%) of 37 studies to be of high<sup>30–32,35,40,46,47,55–60,65</sup> or acceptable<sup>33,36–38,41–45,48–50,61,62,66</sup> quality (table 3). Eight (22%) of 37 studies<sup>34,39,51–54,63,64</sup> were considered low quality because of a high risk of bias though factors such as: performance bias, detection bias, selection bias, unclear case definitions, attrition, and absence of adjustment for confounding factors across all the study types used in the analysis.

### Associations between poverty and suicidal ideations and behaviours

Table 4 and table 5 summarise the associations between suicidal ideations and behaviours and poverty reported in 37 included studies (full details in appendix). In 18 studies reporting the association between completed suicide and poverty, including one study reporting on both suicide dimensions, 31 associations were explored and split into bivariate and multivariate analyses. Most bivariate analyses were positive, indicating increased completed suicide with increased poverty: nine (56%) of 16 associations compared with four (25%) that reported a null association, one (6%) reporting a negative association, and two (13%) reporting an unclear association. Conversely, few multivariate analyses were positive: five (33%) of 15 associations, but about half (seven [47%] of 15 associations) reported a null association in this type of analysis, and three (20%) reported an unclear association. Of the 20 studies reporting on the association between non-fatal suicidal ideations and behaviours and poverty, including one

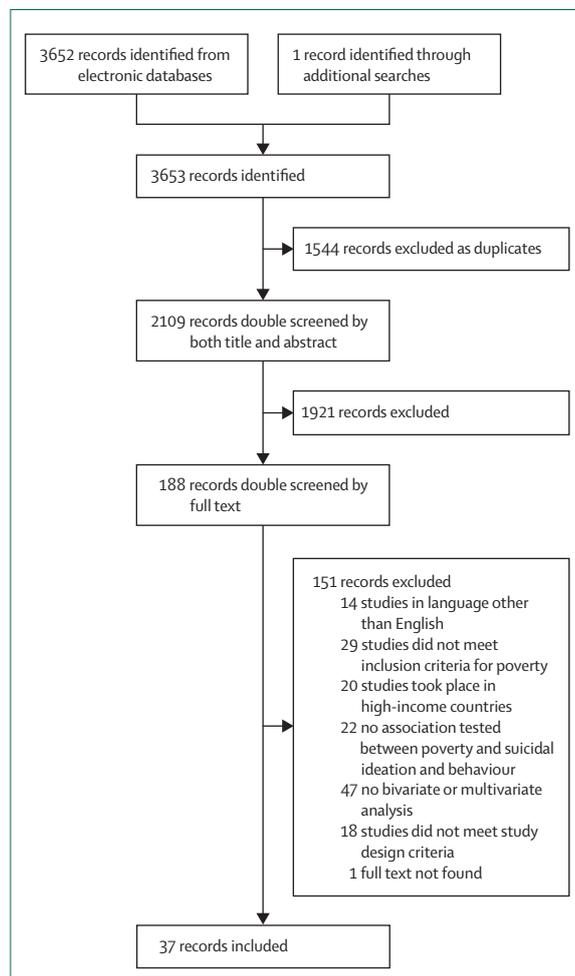


Figure: Study selection

study reporting on both suicide dimensions, 36 associations were explored. Most of the associations were positive, indicating increased non-fatal suicidal ideations and behaviours were associated with increased poverty. 12 (55%) of 22 positive associations used bivariate analysis and nine (64%) of 14 associations used multivariate analysis. Fewer of the associations were null, and were not statistically significant: nine (41%) of 22 associations using bivariate analysis and five (36%) of 14 associations using multivariate analysis. No study reported a negative association using multivariate analysis. However, when considering each poverty dimension separately, we found substantial variations.

### Absolute and relative poverty

No study investigated the association between suicidal ideations and behaviours and absolute poverty. One study<sup>12</sup> from Belarus found a positive association between completed suicide and relative poverty (marginal effects [ $\beta$ ]=0.3 SE=0.0 for males and  $\beta$ =0.03 SE=0.0 for females) through multivariate analysis. Another study<sup>65</sup> testing the association between non-fatal suicidal ideations and behaviours and relative poverty reported a positive association with 12-month suicidal ideations (odds ratio [OR] 1.5, 95% CI 1.2–2.6) and plans (OR 1.7, 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

|                                    | Number of studies (%)  |
|------------------------------------|--|
| <b>WHO region*</b>                 |  |
| AFRO                               | 3 (8) <sup>30-32</sup>                                       |
| AMRO                               | 2 (5) <sup>33,34</sup>                                       |
| EMRO                               | 5 (14) <sup>35-39</sup>                                      |
| EURO                               | 6 (16) <sup>40-45</sup>                                      |
| SEARO                              | 9 (24) <sup>46-54</sup>                                      |
| WPRO                               | 10 (27) <sup>55-64</sup>                                     |
| Multiple                           | 2 (5) <sup>65,66</sup>                                       |
| <b>World Bank income group†</b>    |  |
| LIC                                | 2 (5) <sup>31,32</sup>                                       |
| LMC                                | 9 (24) <sup>37,46-50,52,54,58</sup>                          |
| UMC                                | 24 (65) <sup>30,33-36,38-45,51,53,55-57,59,60,62-64</sup>    |
| Multiple                           | 2 (5) <sup>65,66</sup>                                       |
| <b>Setting</b>                     |  |
| Community based                    | 28 (76) <sup>30-34,37-39,41-44,46,47,49-58,61,62,64,66</sup> |
| Hospital based                     | 5 (14) <sup>35,36,48,60,63</sup>                             |
| Others                             | 3 (8) <sup>45,59,65</sup>                                    |
| N/A                                | 1 (3) <sup>40</sup>  |
| <b>Location</b>                    |  |
| Rural                              | 10 (27) <sup>31,32,46,48,50,51,53,55,61,62</sup>             |
| Urban                              | 9 (24) <sup>38-40,42,43,49,52,58,59,63</sup>                 |
| Both                               | 14 (38) <sup>30,34,35,41,42,44,45,47,54,56,57,64-66</sup>    |
| Other                              | 1 (3) <sup>33</sup>  |
| N/A                                | 3 (8) <sup>36,37,60</sup>                                    |
| <b>Study design</b>                |  |
| Randomised controlled trials       | 0 (0)  |
| Quasi-randomised controlled trials | 0 (0)  |
| Non-randomised controlled trial    | 0 (0)  |
| Before-after studies               | 0 (0)  |
| Interrupted-time series            | 3 (8) <sup>34,64,66</sup>                                    |
| Cohort studies                     | 1 (3) <sup>50</sup>  |
| Case-control studies               | 8 (22) <sup>35,37,40,46,52,53,56,63</sup>                    |
| Cross-sectional studies            | 18 (49) <sup>31,32,36,38,41-45,49,51,54,55,57-62,65</sup>    |
| Case report/case series            | 0 (0)  |
| Ecological studies                 | 4 (11) <sup>33,39,42,48</sup>                                |
| Economic evaluations               | 0 (0)  |
| Economic modelling                 | 3 (8) <sup>30,41,47</sup>                                    |

(Table 2 continues on next column)

|  | Number of studies (%)                                     |
|--|---|
| (Continued from previous column)   |   |
| <b>Poverty dimension</b>   |   |
| Absolute poverty   | 0 (0)   |
| Relative poverty   | 2 (5) <sup>42,65</sup>                                    |
| Economic status and wealth assets  | 16 (43) <sup>31,43-46,50,51,53,54-59,61,63</sup>          |
| Unemployment   | 13 (35) <sup>32,35-40,42,46,48,52,58,65</sup>             |
| Economic/financial problems  | 7 (19) <sup>37,46,49,52,60,62,65</sup>                    |
| Debt   | 3 (8) <sup>51-53</sup>                                    |
| Support from the welfare system  | 1 (3) <sup>39</sup>                                       |
| Economic crisis  | 0 (0)   |
| National income  | 7 (19) <sup>30,33,34,41,47,64,66</sup>                    |
| National level inequalities  | 0 (0)   |
| Composite poverty measure  | 1 (3) <sup>33</sup>                                       |
| <b>Suicide dimension</b>   |   |
| Completed suicide  | 17 (46) <sup>30,33,34,37,39-42,46,47,50-53,56,64,66</sup> |
| Non-fatal suicidal ideations and behaviours  | 19 (51) <sup>31,32,35,36,38,43-45,49,54,55,57-63,65</sup> |
| Both   | 1 (3) <sup>48</sup>                                       |
| Percentage of female patients in included studies was 55%. N/A=not available.  |   |
| *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). †World Bank income groups: low-income country (LIC), lower middle-income country (LMC), and upper middle-income country (UMC). |   |

**Table 2: Study characteristics**

|                         | Low-quality studies   | Acceptable-quality studies        | High-quality studies           |
|-------------------------|-----------------------|-----------------------------------|--------------------------------|
| Interrupted-time series | 2 <sup>34,64</sup>    | 1 <sup>66</sup>                   | 0                              |
| Cohort study            | 0                     | 1 <sup>50</sup>                   | 0                              |
| Case-control study      | 3 <sup>52,53,63</sup> | 1 <sup>37</sup>                   | 4 <sup>35,40,46,56</sup>       |
| Cross-sectional study   | 2 <sup>51,54</sup>    | 8 <sup>36,38,43-45,49,61,62</sup> | 8 <sup>31,32,35,40,57-60</sup> |
| Ecological study        | 1 <sup>39</sup>       | 3 <sup>33,42,48</sup>             | 0                              |
| Economic modelling      | 0                     | 1 <sup>41</sup>                   | 2 <sup>30,47</sup>             |
| Total                   | 8 (22%)               | 15 (41%)                          | 14 (38%)                       |

**Table 3: Study quality**

|  | Positive                       | Negative | Null                  | Unclear         | Total |
|--|--------------------------------|----------|-----------------------|-----------------|-------|
| <b>Absolute poverty</b>                  | ..                             | ..       | ..                    | ..              | ..    |
| Fatal suicide                            | ..                             | ..       | ..                    | ..              | ..    |
| Bivariate                                | 0                              | 0        | 0                     | 0               | 0     |
| Multivariate                             | 0                              | 0        | 0                     | 0               | 0     |
| Non-fatal suicide                        |                                |          |                       |                 |       |
| Bivariate                                | 0                              | 0        | 0                     | 0               | 0     |
| Multivariate                             | 0                              | 0        | 0                     | 0               | 0     |
| <b>Relative poverty</b>                  |                                |          |                       |                 |       |
| Fatal suicide                            | ..                             | ..       | ..                    | ..              | ..    |
| Bivariate                                | 0                              | 0        | 0                     | 0               | 0     |
| Multivariate                             | 1 <sup>42</sup>                | 0        | 0                     | 0               | 1     |
| Non-fatal suicide                        | ..                             | ..       | ..                    | ..              | ..    |
| Bivariate                                | 1 <sup>65</sup>                | 0        | 1 <sup>65</sup>       | 0               | 2     |
| Multivariate                             | 0                              | 0        | 0                     | 0               | 0     |
| <b>Economic status and wealth assets</b> |                                |          |                       |                 |       |
| Fatal suicide                            | ..                             | ..       | ..                    | ..              | ..    |
| Bivariate                                | 2 <sup>53,56</sup>             | 0        | 2 <sup>46,50</sup>    | 0               | 4     |
| Multivariate                             | 0                              | 0        | 3 <sup>50,51</sup>    | 0               | 3     |
| Non-fatal suicide                        | ..                             | ..       | ..                    | ..              | ..    |
| Bivariate                                | 6 <sup>31,44,58,59,61,63</sup> | 0        | 4 <sup>43-45,57</sup> | 0               | 10    |
| Multivariate                             | 6 <sup>44,54,55,57,58,61</sup> | 0        | 1 <sup>55</sup>       | 0               | 7     |
| <b>Unemployment</b>                      |                                |          |                       |                 |       |
| Fatal suicide                            | ..                             | ..       | ..                    | ..              | ..    |
| Bivariate                                | 3 <sup>37,40,52</sup>          | 0        | 1 <sup>46</sup>       | 0               | 4     |
| Multivariate                             | 1 <sup>39</sup>                | 0        | 1 <sup>48</sup>       | 1 <sup>42</sup> | 3     |
| Non-fatal suicide                        | ..                             | ..       | ..                    | ..              | ..    |
| Bivariate                                | 3 <sup>36,38,65</sup>          | 0        | 3 <sup>36,58,65</sup> | 1 <sup>32</sup> | 7     |
| Multivariate                             | 1 <sup>38</sup>                | 0        | 3 <sup>35,36,48</sup> | 0               | 4     |
| <b>Economic or financial problems</b>    |                                |          |                       |                 |       |
| Fatal suicide                            | ..                             | ..       | ..                    | ..              | ..    |
| Bivariate                                | 1 <sup>37</sup>                | 0        | 1 <sup>46</sup>       | 1 <sup>52</sup> | 3     |
| Multivariate                             | 0                              | 0        | 0                     | 0               | 0     |
| Non-fatal suicide                        | ..                             | ..       | ..                    | ..              | ..    |
| Bivariate                                | 2 <sup>60</sup>                | 0        | 1 <sup>30</sup>       | 0               | 3     |
| Multivariate                             | 2 <sup>49,62</sup>             | 0        | 1 <sup>60</sup>       | 0               | 3     |

(Table 4 continues in next column)

|                                  | Positive           | Negative | Null            | Unclear | Total |
|----------------------------------|--------------------|----------|-----------------|---------|-------|
| (Continued from previous column) |                    |          |                 |         |       |
| <b>Debt</b>                      |                    |          |                 |         |       |
| Fatal suicide                    | ..                 | ..       | ..              | ..      | ..    |
| Bivariate                        | 2 <sup>52,53</sup> | 0        | 0               | 0       | 2     |
| Multivariate                     | 0                  | 0        | 1 <sup>51</sup> | 0       | 1     |
| Non-fatal suicide                | ..                 | ..       | ..              | ..      | ..    |
| Bivariate                        | 0                  | 0        | 0               | 0       | 0     |
| Multivariate                     | 0                  | 0        | 0               | 0       | 0     |
| <b>Welfare support</b>           |                    |          |                 |         |       |
| Fatal suicide                    | ..                 | ..       | ..              | ..      | ..    |
| Bivariate                        | 0                  | 0        | 0               | 0       | 0     |
| Multivariate                     | 1 <sup>39</sup>    | 0        | 0               | 0       | 1     |
| Non-fatal suicide                | ..                 | ..       | ..              | ..      | ..    |
| Bivariate                        | 0                  | 0        | 0               | 0       | 0     |
| Multivariate                     | 0                  | 0        | 0               | 0       | 0     |
| <b>Subtotal</b>                  |                    |          |                 |         |       |
| Fatal suicide                    | ..                 | ..       | ..              | ..      | ..    |
| Bivariate                        | 8                  | 0        | 4               | 1       | 13    |
| Multivariate                     | 3                  | 0        | 5               | 1       | 9     |
| Non-fatal suicide                | ..                 | ..       | ..              | ..      | ..    |
| Bivariate                        | 12                 | 0        | 9               | 1       | 22    |
| Multivariate                     | 9                  | 0        | 5               | 0       | 14    |

Data are number of associations acquired from bivariate and multivariate analysis. 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 individual-level poverty measures, suicide dimension, and analysis method**

Health Survey. These studies were analysed with bivariate analysis.

**Economic status and wealth**

16 studies explored the association between suicidal ideations and behaviours and economic status or wealth. Five studies<sup>46,50,51,53,56</sup> focused on completed suicide. Two studies<sup>53,56</sup> reported positive and two studies<sup>46,50</sup> reported null associations when using bivariate analysis. However, where multivariate analysis was used in two Indian studies, only null associations were found for value of livestock and value of agricultural produce among farmers<sup>61</sup> and for monthly household income.<sup>50</sup>

Of the 11 studies on non-fatal suicidal ideations and behaviours, six studies<sup>31,44,58,59,61,63</sup> using bivariate analysis reported a positive association and four studies<sup>43-45,57</sup>

reported a null association. However, all studies<sup>44,46,54,55,57,58,61</sup> making use of a multivariate analysis found a positive association except one,<sup>55</sup> 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 (2.25, 1.21-4.19) and suicide plan (2.15, 1.04-4.41),<sup>55</sup> family economic status was associated with 6-month rate of severe suicidal ideation (1.52, 1.07-2.15),<sup>61</sup> and monthly income was associated with lifetime prevalence of suicidal attempts (0.2, 0.06-0.6).<sup>57</sup> In India, perceived economic status was associated with 12-month prevalence of suicidal ideation (2.23, 1.62-3.06) and suicide attempt (2.92, 1.63-5.21).<sup>54</sup> In Vietnam, low income was associated with lifetime prevalence of suicidal ideation (1.7, 1.1-2.6).<sup>58</sup> In Turkey, low income was associated with lifetime prevalence of self-harm (2.10, 1.07-4.12).<sup>44</sup>

**Unemployment**

13 studies investigated the association between suicidal ideations and behaviours and unemployment. Six studies<sup>37,39,40,42,46,52</sup> focused on completed suicide and six studies<sup>32,35,36,38,58,65</sup> on non-fatal suicidal ideations and behaviours, with one<sup>48</sup> looking at both dimensions.

Among the seven studies reporting on completed suicide, three<sup>37,40,52</sup> reported a positive and one<sup>46</sup> reported a null association between completed suicide and unemployment using bivariate analysis. Results were mixed when studies were analysed with multivariate analysis, with one<sup>39</sup> showing a positive association with female low labour force participation in Iran ( $r=-0.38$ ), one<sup>48</sup> reporting null association with unemployment rates in the working age population in Sri Lanka (incidence rate ratio 1.29, 95% CI 0.96–1.72), and another<sup>42</sup> showing an unclear association with unemployment rates among men and women in Belarus.

Among the seven studies investigating non-fatal suicidal ideations and behaviours, results were mixed for studies using bivariate analysis, with three<sup>36,38,65</sup> showing positive and three<sup>38,58,65</sup> showing null associations. When multivariate analysis was used, only one Iranian study<sup>38</sup> 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-burning<sup>35</sup> and self-reported responses to the Harmful Behaviour Scale and the Beck Scale for Suicidal Ideation,<sup>36</sup> both in Iran and Sri Lanka.<sup>48</sup>

### Economic or financial problems

Seven studies explored the association between suicide and economic or financial problems. All three studies focusing on completed suicide were measured by bivariate analysis only, reporting one positive,<sup>37</sup> one null,<sup>46</sup> and one unclear<sup>52</sup> association. In four<sup>49,60,62,65</sup> studies on non-fatal suicidal ideations and behaviours, results from one<sup>60</sup> showed a positive association, although results from another<sup>65</sup> showed a null association using bivariate analyses. With the use of multivariate analyses, the results were similar with two studies reporting positive associations between non-fatal suicidal ideations and behaviours and economic or financial problems. One study<sup>49</sup> reported a positive association between the perceived amount of stress due to economic circumstances and lifetime suicidal ideation (OR 1.17, 95% CI 1.11–1.24) or lifetime suicidal attempt (1.19, 1.08–1.31) in India. A similar association was shown between becoming a female sex worker because of financial necessity and 6-month occurrence of suicidal attempts among female sex workers in China (0.24, 0.09–0.58).<sup>62</sup> A null association was shown between financial burden for managing the autoimmune disorder, lupus, and suicidal ideation in China.<sup>60</sup>

### Debt and welfare support

Three studies investigated the association between debt and completed suicide. Although results were positive for the two<sup>52,53</sup> studies using bivariate analysis, there was a null association in a study<sup>51</sup> looking at debt and suicides in farmers in India with multivariate analysis. One study in Iran<sup>39</sup> explored the association between welfare

support and completed suicide. The multivariate analysis showed a positive association between completed suicide and women receiving welfare support ( $r=-0.58$ ).

### Economic crisis, national income, and national-level inequalities

No study explored the association between suicidal ideations and behaviours and economic crises or national-level inequalities. However, seven studies<sup>30,33,34,41,47,64,66</sup> investigated the association between suicide and national income. Three studies measured these outcomes with bivariate analysis and had mixed results: one<sup>30</sup> positive

|                                    | Positive           | Negative        | Null            | Unclear            | Total |
|------------------------------------|--------------------|-----------------|-----------------|--------------------|-------|
| <b>Economic crisis</b>             |                    |                 |                 |                    |       |
| Fatal suicide                      | ..                 | ..              | ..              | ..                 | ..    |
| Bivariate                          | 0                  | 0               | 0               | 0                  | 0     |
| Multivariate                       | 0                  | 0               | 0               | 0                  | 0     |
| Non-fatal suicide                  | ..                 | ..              | ..              | ..                 | ..    |
| Bivariate                          | 0                  | 0               | 0               | 0                  | 0     |
| Multivariate                       | 0                  | 0               | 0               | 0                  | 0     |
| <b>National income</b>             |                    |                 |                 |                    |       |
| Fatal suicide                      | ..                 | ..              | ..              | ..                 | ..    |
| Bivariate                          | 1 <sup>30</sup>    | 1 <sup>66</sup> | 0               | 1 <sup>34</sup>    | 3     |
| Multivariate                       | 2 <sup>41,64</sup> | 0               | 1 <sup>33</sup> | 2 <sup>30,47</sup> | 5     |
| Non-fatal suicide                  | ..                 | ..              | ..              | ..                 | ..    |
| Bivariate                          | 0                  | 0               | 0               | 0                  | 0     |
| Multivariate                       | 0                  | 0               | 0               | 0                  | 0     |
| <b>National-level inequalities</b> |                    |                 |                 |                    |       |
| Fatal suicide                      | ..                 | ..              | ..              | ..                 | ..    |
| Bivariate                          | 0                  | 0               | 0               | 0                  | 0     |
| Multivariate                       | 0                  | 0               | 0               | 0                  | 0     |
| Non-fatal suicide                  | ..                 | ..              | ..              | ..                 | ..    |
| Bivariate                          | 0                  | 0               | 0               | 0                  | 0     |
| Multivariate                       | 0                  | 0               | 0               | 0                  | 0     |
| <b>Composite poverty measure</b>   |                    |                 |                 |                    |       |
| Fatal suicide                      | ..                 | ..              | ..              | ..                 | ..    |
| Bivariate                          | 0                  | 0               | 0               | 0                  | 0     |
| Multivariate                       | 0                  | 0               | 1 <sup>33</sup> | 0                  | 1     |
| Non-fatal suicide                  | ..                 | ..              | ..              | ..                 | ..    |
| Bivariate                          | 0                  | 0               | 0               | 0                  | 0     |
| Multivariate                       | 0                  | 0               | 0               | 0                  | 0     |
| <b>Subtotal</b>                    |                    |                 |                 |                    |       |
| Fatal suicide                      | ..                 | ..              | ..              | ..                 | ..    |
| Bivariate                          | 1                  | 1               | 0               | 1                  | 3     |
| Multivariate                       | 2                  | 0               | 2               | 2                  | 6     |
| Non-fatal suicide                  | ..                 | ..              | ..              | ..                 | ..    |
| Bivariate                          | 0                  | 0               | 0               | 0                  | 0     |
| Multivariate                       | 0                  | 0               | 0               | 0                  | 0     |

Data are number of associations acquired from bivariate and multivariate analysis. Fatal refers to completed suicide. Non-fatal includes all remaining suicidal ideations and behaviours: ideation, plan, attempt, and self-harm.

**Table 5: Positive, negative, null, and unclear associations between country-level poverty measures, suicide dimension, and analysis method**

with the inflation rate in South Africa, one<sup>66</sup> negative with Purchasing Power Parity-adjusted gross domestic product (GDP) per capita across multiple countries, and one<sup>34</sup> unclear association with GDP per capita in Brazil. When multivariate analyses were used, results continued to be mixed. Two positive associations with per-capita real income in Turkey (long-run elasticity of suicide with respect to income  $-0.41$  [for which a 1% increase in per capita real income results in 0.41% decrease in numbers of suicides])<sup>41</sup> and with per-capita GDP adjusted for inflation in urban ( $\beta=-0.57$ ,  $SE=0.20$ ) and also in rural China ( $\beta=-0.68$ ,  $SE=0.06$ ).<sup>64</sup> One<sup>33</sup> null association with per-capita GDP in Brazil, and two unclear associations with the inflation rate in South Africa<sup>30</sup> and with GDP per capita in India<sup>47</sup> were found.

#### Composite poverty measure

One study<sup>33</sup> explored the association between suicide and composite poverty measures. With a 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 more than half of individual-level studies reported a positive association between economic adversity using various poverty measures and completed suicide in bivariate analyses. However, this association became more attenuated in multivariate analyses. In the case of non-fatal suicidal ideations and behaviours, both bivariate and multivariate analyses showed that approximately 60% of studies reported a positive association with poverty. The results from the remaining studies showed a null or unclear association, with few showing a negative association. 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 various poverty indicators, appears to increase risk for suicidal ideations and behaviours in low-income and middle-income countries. However, the relationship between poverty and these behaviours in low-income and middle-income countries is complex.

First, the effect of poverty on risk of suicidal ideations and behaviours appears to attenuate when multivariate analyses are done and other distal and proximal variables are controlled for, particularly in the case of completed suicide. This trend was not evident in non-fatal suicidal ideations and behaviours, where both bivariate and multivariate analyses showed consistent trends.

Second, the findings for individual and country-level studies were quite different. Whereas there were consistent associations between poverty and risk of suicidal ideations and behaviours at the individual level,

there were no such trends at the country level. This trend could indicate that at a country level, various confounding variables acting either within or between the comparison groups might not be accounted for in the study design. The country-level evidence is insufficient to draw clear conclusions regarding the effects of economic variables on a macro scale on completed suicide.

Third, 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 than do debt and welfare support. Most studies had objective indicators of poverty (eg, mean family income, loans) and relied on self-report or family-report measures. Few studies asked participants if they considered themselves as living in poverty. This is an important distinction, as some people might not perceive themselves as living in poverty, although fulfilling the criteria of poverty according to definitions.

Fourth, variations in the association between suicide and poverty might also reflect varying measures of suicide made use of in studies. Research on suicide has long been hampered by problems inherent in defining and measuring suicidal ideations and behaviours and the inconsistent use of terminology.<sup>67</sup> These problems manifest in the inconsistency in the definition of suicidal phenomena and its measurement in included studies. In some, for example, suicidal ideation is defined as “thoughts of killing oneself”<sup>60</sup> although others define the same concept as “a spectrum of self-destructive thoughts or ideas”.<sup>32</sup> Some studies focus on particular kinds of non-fatal suicidal ideations and behaviours (eg, burning oneself), but others have broader inclusion criteria (eg, self-harm). A further problem confounding the interpretation of findings and making comparisons difficult is under-reporting of suicidal ideations and behaviours in some low-income and middle-income countries as a result of poor surveillance systems, stigma, and legal sanctions.

Fifth, different poverty dimensions vary in the strength and consistency of their associations with suicidal ideations and behaviours. For example, although consistent associations were evident for economic status, wealth, and unemployment, the findings were more mixed for debt, welfare support, and relative poverty, which might have played a role in the variability in these findings. Additionally, there could be varying effects of chronic and acute poverty on suicidal ideations and behaviours. Chronic poverty might provide a set of distal economic risk factors for suicidal ideations and behaviours, but acute economic shocks, such as crop failure,<sup>51,53</sup> could provide more immediate causes, which interact with family and individual variables to increase risk for suicidal ideations and behaviours. A previous systematic review<sup>26</sup> found a similar complex picture, with a decrease of socioeconomic position being associated

with an increased risk of completed suicide and suicide attempts in south and Southeast Asia, with variation across dimensions and studies.

Sixth, the evidence was weak on whether the association between suicidal ideations and behaviours and poverty is due to either social causation or social selection. The only longitudinal study of acceptable quality included in this systematic review involved the use of economic status as a confounder and found no significant association between low economic status and completed suicide.<sup>50</sup> A previous review<sup>7</sup> exploring the association between poverty and common mental disorders revealed a similarly complex picture in which various poverty and mental health related variables interact in a complex manner, influenced by both population and measurement factors.

Seventh, both suicidal ideations and behaviours and poverty differ by sex. Globally, suicides rates are slightly less than double for males compared with females<sup>1</sup>, although economic poverty is more common in females.<sup>68</sup> However, sex differences in the association between suicidal ideations and behaviours and poverty were not explored because of scarcely available evidence. Three studies<sup>30,33,42</sup> only explored associations for both female and male participants.

Finally, social factors relating to poverty such as rurality and access to lethal means could explain some of the findings. Living in conditions of poverty might influence access to potentially fatal means of self-injury and therefore might influence the rates of suicide. However, those associations were not explored in the included studies. One study<sup>55</sup> reporting a positive association between non-fatal suicidal ideations and behaviours (suicidal ideation, severe suicidal ideation, suicide plan) and financial status in rural China, reported a positive association between non-fatal suicidal ideations and behaviours (suicidal ideation, severe suicidal ideation) and degree of rurality using a multivariate analysis. Another study<sup>48</sup> done in people who completed or attempted suicide by self-poisoning in rural Sri Lanka, where about 60% of the suicides were due to self-poisoning<sup>69</sup> found a null association between unemployment and both completed suicide and suicidal attempts, but a positive association with being employed in agriculture (with easier access to lethal means) using a multivariate analysis.

This is the first systematic review to our knowledge to explore the association between suicidal ideations and behaviours and poverty in low-income and middle-income countries. The inclusion of both fatal and non-fatal suicidal ideations and behaviours provided an exploration of the entire spectrum of possible suicidal phenomena. However, the study has limitations. 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.<sup>4</sup> Poverty is increasingly understood by

researchers to be more than simply a scarcity of resource or income, and can include cultural, social, and environmental dimensions, such as shame<sup>70</sup> and religious beliefs.<sup>63</sup> Another limitation is that publication bias could have hindered the results, with studies reporting negative and null results being less likely to be published. Moreover, the exclusion of qualitative studies might have limited understanding of how living in poverty might be related to suicidal ideations and behaviours, and the role of cultural, social, and environmental factors. Finally our searches were only run in English, only English full texts were included, and our searches were limited to 2004–14.

Suicide carries not only a considerable burden of disease but also a substantial cost, mainly due to a high proportion of suicide observed in young adulthood and the associated loss in productivity. Although the evidence in low-income and middle-income countries is scarce, in high-income countries the mean cost per suicide has been estimated to range from \$0.4 million to \$4.3 million (in international dollars, 2014), dependent on types of costs included and methods used in the analysis.<sup>71</sup> The Sustainable Development Goals have not only 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 wellbeing”.<sup>72</sup> The mental health action plan 2013–20 published by WHO<sup>73</sup> has also set the goal of a 10% reduction in suicide by 2020 by use of effective interventions (eg, reduced access to pesticides, training programmes for school teachers, follow-up of suicide attempt survivors).<sup>74</sup> These actions need not only to involve health but also other sectors.<sup>1</sup> Our results suggest that interventions addressing the poverty of individuals could have a positive effect on reducing suicidal ideations and behaviours. 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 can be made for specific countries, as there is insufficient evidence to form the basis of future recommendations.

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. Encouraging a more consistent statistical approach towards analysis would also help in facilitating meta-analyses and cross-country comparisons. Although most of the studies in this review were also atheoretical, it would be helpful for future studies in this field to make use of appropriate existing theoretical frameworks and contribute to their adaptation to help understand the cause of suicide and how poverty is implicated in low-income and middle-income country 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, and wrote the first draft. JB contributed to the screening, quality assessment, and data extraction, contributed to the interpretation of data, and 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, and critically revised the report. CL and TL provided advice, contributed to the data extraction, contributed to the interpretation of data, and critically revised the manuscript. EC and DM provided advice, contributed to the interpretation of data, and critically revised the Review.

### Declaration of interests

We declare no competing interests.

### Role of the funding source

This project was supported by a grant from support from the LSE Social Policy Staff Research Fund, the LSE Research Seed Fund and the South African National Research Foundation (Reference: TTK13070620647). CL is supported through the PRogramme for Improving Mental Health carE (PRIME) by UK Aid. The opinions expressed in this Review do not necessarily reflect those of the funders.

### Acknowledgments

We are grateful to Elsie Breet and Jacqui Steadman (Stellenbosch University) for assistance along the systematic review process, and to Matteo Galizzi (London School of Economics and Political Science) for advice during the data analysis.

### References

- WHO. Preventing suicide: a global imperative. Geneva: World Health Organization, 2014.
- Petroni S, Patel V, Patton G. Why is suicide the leading killer of older adolescent girls? *Lancet* 2015; **386**: 2031–32.
- UN. Inequality Matters. Report of the world social situation 2013. New York: United Nations, 2013.
- Alkire S, Foster JE, Seth S, Santos ME, Roche, JM, Ballon P. Multidimensional poverty measurement and analysis. Oxford: Oxford University Press, 2015.
- Stewart F, Harriss-White B, Saith R. Defining poverty in the developing world. New York: Palgrave Macmillan UK, 2007.
- Cooper S, Lund C, Kakuma R. The measurement of poverty in psychiatric epidemiology in LMICs: critical review and recommendations. *Soc Psychiatry Psychiatr Epidemiol* 2012; **47**: 1499–516.
- Lund C, Breen A, Flisher AJ, et al. Poverty and common mental disorders in low and middle income countries: a systematic review. *Soc Sci Med* 2010; **71**: 517–28.
- Das J, Do QT, Friedman J, McKenzie D, Scott K. Mental health and poverty in developing countries: revisiting the relationship. *Soc Sci Med* 2007; **65**: 467–80.
- Patel V, Kleinman A. Poverty and common mental disorders in developing countries. *Bull World Health Organ* 2003; **81**: 609–15.
- McDaid D, Kennelly B. An economic perspective on suicide across the five continents. In: Wasserman D, Wasserman C, eds. Oxford Textbook of Suicidology and Suicide Prevention. Oxford: Oxford University Press, 2009.
- Durkheim E. Le Suicide. Etude de Sociologie. Paris: Félix Alcan, 1897.
- Henry AF, Short JF. Suicide and homicide: some economic, sociological and psychological aspects of aggression. Glencoe: Free Press, 1954.
- Hamermesh DS, Soss NM. An economic theory of suicide. *J Polit Econ* 1974; **82**: 83–98.
- Lester D, Yang BJ. Microsocioeconomics versus macrosocioeconomics as a model for examining suicide. *Psychol Rep* 1991; **69**: 735–38.
- Marcotte DE. The economics of suicide, revisited. *South Econ J* 2003; **69**: 628–43.
- Fliege H, Lee JR, Grimm A, Klapp BF. Risk factors and correlates of deliberate self-harm behavior: A systematic review. *J Psychosom Res* 2009; **66**: 477–93.
- Hor K, Taylor M. Suicide and schizophrenia: a systematic review of rates and risk factors. *J Psychopharmacol* 2010; **24**: 81–90.
- Schaffer A, Isometsä ET, Tondo L, et al. International Society for bipolar disorders task force on suicide: meta-analyses and meta-regression of correlates of suicide attempts and suicide deaths in bipolar disorder. *Bipolar Disord* 2015; **17**: 1–16.
- Hawton K, Casañas i Comabella C, Haw C, Saunders K. Risk factors for suicide in individuals with depression: a systematic review. *J Affect Disord* 2013; **147**: 17–28.
- Colucci E, Lester D (eds). Suicide and culture: understanding the context. Göttingen: Hogrefe Publishing, 2012.
- Platt S. Inequalities and suicidal behaviour. In: O'Connor RC, Platt S, Gordon J, eds. International handbook of suicide prevention: research, policy and practice. Chichester: Wiley Blackwell, 2011: 211–34.
- Vijayakumar L, John S, Pirkis J, Whiteford H. Suicide in developing countries (2): risk factors. *Crisis* 2005; **26**: 112–19.
- Nordt C, Warnke I, Seifritz E, Kawohl W. Modelling suicide and unemployment: a longitudinal analysis covering 63 countries, 2000–11. *Lancet Psychiatry* 2015; **2**: 239–45.
- Oyesanya M, Lopez-Morinigo J, Dutta R. Systematic review of suicide in economic recession. *World J Psychiatry* 2015; **5**: 243–54.
- Rehkopf DH, Buka SL. The association between suicide and the socio-economic characteristics of geographical areas: a systematic review. *Psychol Med* 2006; **36**: 145–58.
- Knipe DW, Carroll R, Thomas KH, Pease A, Gunnell D, Metcalfe C. Association of socio-economic position and suicide/attempted suicide in low and middle income countries in South and South-East Asia—a systematic review. *BMC Public Health* 2015; **15**: 1055.
- Coudouel A, Hentschel JS, Wodon QT. Poverty Measurement and Analysis. In: World Bank (ed). PRSP Sourcebook. Washington, DC: World Bank, 2010.
- World Bank. Country and Lending Groups. Washington, DC: World Bank Group, 2013. <http://data.worldbank.org/about/countryclassifications/country-and-lending-groups> (accessed April 1, 2014).
- SIGN. Critical appraisal: Notes and checklists. Edinburgh: Scottish Intercollegiate Guidelines Network, 2015.
- Botha F. The Economics of Suicide in South Africa. *S Afr J Econ* 2012; **80**: 526–52.
- Kinyanda E, Kizza R, Levin J, Ndyababangi S, Abbo C. Adolescent suicidality as seen in rural northeastern Uganda: prevalence and risk factors. *Crisis* 2011; **32**: 43–51.
- Ovuga, E, Boardman J, Wassermann DY. Prevalence of suicide ideation in two districts of Uganda. *Arch Suicide Res* 2005; **9**: 321–32.
- Faria NM, Victora CG, Meneghel SN, de Carvalho LA, Falk JW. Suicide rates in the State of Rio Grande do Sul, Brazil: association with socioeconomic, cultural, and agricultural factors. *Cad Saude Publica* 2006; **22**: 2611–21.
- Bando DH, Brunoni AR, Benseñor IM, Lotufo PA. Suicide rates and income in São Paulo and Brazil: a temporal and spatial epidemiologic analysis from 1996 to 2008. *BMC Psychiatry* 2012; **12**: 127.
- Ahmadi A, Mohammadi R, Schwebel DC, Khazaie H, Yeganeh N, Almasi A. Demographic risk factors of self-immolation: a case-control study. *Burns* 2009; **35**: 580–86.
- Ekratzadeh S, Javadpour A, Draper B, Mani A, Withall A, Sahraian A. Prevalence and correlates of suicidal thought and self-destructive behavior among an elderly hospital population in Iran. *Int Psychogeriatr* 2012; **24**: 1402–08.
- Khan MM, Mahmud S, Karim MS, Zaman M, Prince M. Case-control study of suicide in Karachi, Pakistan. *Br J Psychiatry* 2008; **193**: 402–05.
- Nojomi M, Malakouti SK, Bolhari J, Poshtmashhadi M. A predictor model for suicide attempt: evidence from a population-based study. *Arch Iran Med* 2007; **10**: 452–58.
- Aliverdinia A, Pridemore WA. Women's fatalistic suicide in Iran: a partial test of Durkheim in an Islamic republic. *Violence Against Women* 2009; **15**: 307–20.
- Almasi K, Belso N, Kapur N, et al. Risk factors for suicide in Hungary: a case-control study. *BMC Psychiatry* 2009; **9**: 45.
- Altınanahtar, A, Halicioglu F. A dynamic econometric model of suicides in Turkey. *J Socio Econ* 2009; **38**: 903–07.

- 42 Grigoriev P, Doblhammer-Reiter G, Shkolnikov V. Trends, patterns, and determinants of regional mortality in Belarus, 1990–2007. *Popul Stud (Camb)* 2013; **67**: 61–81.
- 43 Polatöz O, Kugu N, Dogan O, et al. The prevalence of suicidal behaviour and its correlation with certain sociodemographic variables in Sivas province. *Dusunen Adam* 2011; **24**: 13–23.
- 44 Toprak S, Cetin I, Guven T, Can G, Demircan C. Self-harm, suicidal ideation and suicide attempts among college students. *Psychiatry Res* 2011; **187**: 140–44.
- 45 Toros F, Bilgin NG, Sasmaz T, Bugdayci R, Camdeviren H. Suicide attempts and risk factors among children and adolescents. *Yonsei Med J* 2004; **45**: 367–74.
- 46 Manoranjitham SD, Rajkumar AP, Thangadurai P, Prasad J, Jayakaran R, Jacob KS. Risk factors for suicide in rural south India. *Br J Psychiatry* 2010; **196**: 26–30.
- 47 Pandey MK, Kaur C. Investigating suicidal trend and its economic determinants: Evidence from India. ASARC Working Paper 2009-08. Canberra: Australia South Asia Research Center, 2009.
- 48 Manuel C, Gunnell DJ, van der Hoek W, Dawson A, Wijeratne IK, Konradsen F. Self-poisoning in rural Sri Lanka: small-area variations in incidence. *BMC Public Health* 2008; **8**: 26.
- 49 Nath Y, Paris J, Thombs B, Kirmayer L. Prevalence and social determinants of suicidal behaviours among college youth in India. *Int J Soc Psychiatry* 2012; **58**: 393–99.
- 50 Sauvagat C, Ramadas K, Fayette JM, Thomas G, Thara S, Sankaranarayanan R. Completed suicide in adults of rural Kerala: rates and determinants. *Natl Med J India* 2009; **22**: 228–33.
- 51 Gedela SPR. Factors responsible for agrarian crisis in Andhra Pradesh (a logistic regression analysis). *World Appl Sci J* 2008; **4**: 707–13.
- 52 Gururaj G, Isaac MK, Subbakrishna DK, Ranjani R. Risk factors for completed suicides: a case-control study from Bangalore, India. *Inj Control Saf Promot* 2004; **11**: 183–91.
- 53 Kaur P, Dhaliwal HS, Singh SY. Farmers' suicides in Punjab: a discriminant analysis approach. *Indian J Econ* 2011; **91**: 543–50.
- 54 Mukhopadhyay DK, Mukhopadhyay S, Sinhababu A, Biswas AB. Are the adolescent behaviors too risky? A school-based study in a district of west Bengal, India. *J Trop Pediatr* 2012; **58**: 496–500.
- 55 Dai J, Chiu HF, Conner KR, et al. Suicidal ideation and attempts among rural Chinese aged 16–34 years—Socio-demographic correlates in the context of a transforming China. *J Affect Disord* 2011; **130**: 438–46.
- 56 Kong Y, Zhang J. Access to farming pesticides and risk for suicide in Chinese rural young people. *Psychiatry Res* 2010; **179**: 217–21.
- 57 Ma X, Xiang TY, Cai ZJ, et al. Lifetime prevalence of suicidal ideation, suicide plans and attempts in rural and urban regions of Beijing, China. *Aust N Z J Psychiatry* 2009; **43**: 158–66.
- 58 Tran Thi Thanh H, Tran TN, Jiang GX, Leenaars A, Wasserman D. Life time suicidal thoughts in an urban community in Hanoi, Vietnam. *BMC Public Health* 2006; **6**: 76.
- 59 Wan YH, Hu CL, Hao JH, Sun Y, Tao FB. Deliberate self-harm behaviors in Chinese adolescents and young adults. *Eur Child Adolesc Psychiatry* 2011; **20**: 517–25.
- 60 Xie LF, Chen PL, Pan HF, et al. Prevalence and correlates of suicidal ideation in SLE inpatients: Chinese experience. *Rheumatol Int* 2012; **32**: 2707–14.
- 61 Gong YH, Zhang L, Wang ZQ, Liang Y. Pathway analysis of risk factors for severe suicidal ideation: a survey in rural China. *Can J Public Health* 2011; **102**: 472–75.
- 62 Hong Y, Li X, Fang X, Zhao R. Correlates of suicidal ideation and attempt among female sex workers in China. *Health Care Women Int* 2007; **28**: 490–505.
- 63 Zhang J, Jia SH, Jiang C, Sun J. Characteristics of Chinese suicide attempters: an emergency room study. *Death Stud* 2006; **30**: 259–68.
- 64 Zhang J, Ma J, Jia C, et al. Economic growth and suicide rate changes: a case in China from 1982 to 2005. *Eur Psychiatry* 2010; **25**: 159–63.
- 65 Borges G, Nock MK, Haro Abad JM, et al. Twelve-month prevalence of and risk factors for suicide attempts in the World Health Organization world mental health surveys. *J Clin Psychiatry* 2010; **71**: 1617–28.
- 66 Blasco-Fontecilla H, Perez-Rodriguez MM, Garcia-Nieto R, et al. Worldwide impact of economic cycles on suicide trends over 3 decades: differences according to level of development. A mixed effect model study. *BMJ Open* 2012; **2**: e000785.
- 67 Silverman MM, Berman AL, Sanddal ND, O'Carroll PW, Joiner TE. Rebuilding the tower of babel: a revised nomenclature for the study of suicide and suicidal behaviors. Part 1: background, rationale, and methodology. *Suicide Life Threat Behav* 2007; **37**: 248–63.
- 68 World Bank. World Development Report 2012: gender equality and development. Washington, DC: World Bank, 2012.
- 69 Sri Lanka Police. Mode of Suicide 2005. 2005. <http://www.police.lk/index.php/crime-trends> (accessed March 3, 2016).
- 70 Walker R, Bantebya Kyomuhendo G, Chase E, et al. Poverty in global perspective: is shame a common denominator? *J Soc Policy* 2013; **42**: 215–33.
- 71 McDaid D. Making an economic case for investing in suicide prevention: quo vadis? In: O'Connor RC, Pirkis J, eds. *International Handbook of Suicide Prevention: Research, Policy and Practice*. 2nd edn. Chichester: Wiley Blackwell, in press.
- 72 UN. Transforming Our World: The 2030 Agenda for Sustainable Development. New York: United Nations, 2015.
- 73 WHO. Mental Health Action Plan 2013–2020. Geneva: World Health Organization, 2013.
- 74 WHO. WHO mhGAP Guideline Update. Update of the Mental Health Gap Action Programme (mhGAP) guideline for mental, neurological and substance use disorders. Geneva: World Health Organization, 2015.