


BMJ Open Do social protection programmes have a causal effect on suicide mortality? A protocol for a systematic review and meta-analysis

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ABSTRACT

Introduction Recent international and national strategies to reduce suicide mortality have suggested that social protection programmes may be an effective multisectoral response given the link between material deprivation and suicides in observational studies. However, there is a lack of evidence on the causal relationship between social protection programmes and suicide, which may hinder substantial national budget reallocations necessary to implement these policies. Social protection programmes are government interventions that ensure adequate income now and in the future, through changes to earned income (eg, minimum wage increase) or social security (via cash transfers or cash equivalents). Our review aims to evaluate the existing evidence on a causal relationship between social protection programmes and suicide mortality by examining all relevant experimental and quasi-experimental studies between January 1980 and November 2021.

Methods and analysis The review will be conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline. We will search references published between 1 January 1980 and 30 November 2021 in 10 electronic databases, including MEDLINE (PubMed), PsycINFO, EMBASE and Applied Social Sciences Index Abstracts. Seven reviewers will independently participate in screening studies from titles, abstracts and full texts across all the stages. Experimental (ie, randomised controlled trials) and quasi-experimental studies (ie, non-randomised interventional studies) written in English, French, Spanish, German, Chinese, Korean and Japanese examining the impact of income security programmes on suicide mortality were included. Meta-analyses will be conducted if there are at least three studies with similar income security programmes.

Ethics and dissemination Our proposed review does not require ethical approval. In collaboration with our community partners, we will develop a policy brief for stakeholders to support efforts to implement social protection programmes to help prevent suicides. Our findings will be presented at conferences, published in a peer-reviewer journal and promoted on social media platforms.

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Strengths and limitations of this study

- By focusing on studies that use non-randomised/randomised experimental designs, our review is able to synthesise causal evidence of the effect of social protection programmes on suicide prevention.
- Our inclusion of a comprehensive set of social protection programmes will provide policy-makers novel insights on a range of diverse programmes for decision-making.
- Since the review will include a range of different social protection programmes, there is a greater chance that we will find heterogeneous effects.
- There is potential for reviews of secondary data to have publication bias, where published studies are more likely to report significant findings rather than null findings.

INTRODUCTION

Suicide accounts for 1.4% of deaths worldwide,¹ and many more suicides are likely misclassified as unintentional or underterminable injuries.² In 2014, the WHO formalised a global strategy to prevent suicides by calling on member states to implement multisectoral action, such as restricting common means (including pesticides, firearms and certain medications), reducing inappropriate media reporting, increasing access to services to manage mental illnesses, introducing appropriate alcohol policies and reducing stigma and increasing social support at the community level.¹ While poverty and material deprivation are well-established risk factors of suicides,³ social protection programmes to reduce the risk of socioeconomic adversity on suicides have not been featured as a mainstream intervention in the global discourse. Social protection programmes are government interventions that ensure adequate income now



and in the future, through changes to earned income (eg, minimum wage increase) or social security (via cash transfers or cash equivalents).^{4 5} Social protection programmes include a range of government programmes aimed at (partially) ameliorating the negative impact of predictable and unpredictable risks (eg, chronic poverty, dependency in childhood, frailty in old age, job loss, sickness/injuries and family breakdown). These programmes aim to compensate for income losses associated with these risks, and enable people to return to their everyday life. The impact of social protection programmes is not restricted to poverty alleviation but may include reducing income inequality and promoting the overall well-being of societies.

In 2017, the US Centers for Disease Control and Prevention developed a national suicide prevention strategy that included a focus on policies to strengthen economic support as part of the national multisectoral response to suicides.⁶ This publication reflects a paradigm shift among suicide prevention strategies since no similar documents to date, at the global or national government levels, have recommended the promotion of social protection as part of comprehensive multisectoral action. Despite the new policy direction for suicide prevention, and the wider recognition that poverty, income loss and material deprivation are risk factors for suicide,⁷ there are currently a lack of systematic reviews that evaluate the effectiveness of social protection programmes to reduce suicides. In order to provide strong evidence to justify the substantial national budget reallocations necessary to implement these policies, our study will systematically review evidence to evaluate the causal link between various social protection programmes and suicide mortality.

Economic insecurity and suicides in observational studies

The association between material deprivation and suicide is well established in psychiatric epidemiology literature.⁸⁻¹⁰ In a systematic review of psychiatric and socioeconomic risk factors for suicide in high-income countries, low income was associated with an increased relative risk of suicide by 2.18 in men and by 1.45 in women.⁸ Similar associations have been identified in systematic reviews with evidence from low-income and middle-income countries. One review investigated suicide and poverty, and found that worse economic status and diminished wealth were positively associated with suicidal behaviour and ideation at the individual level, although these trends were not observed at the country level.⁹ Across low-income and middle-income South and South-East Asian countries, another review found a consistent association between financial strain and suicide, where those in low socioeconomic positions had a threefold increased risk of suicide.¹⁰

Despite the consistent findings on the association between economic insecurity and suicide risk, observational studies have a limited ability to draw causal inference.¹¹ Potential shortcomings in these observational studies include: (1) the inability of case-control and cohort studies to effectively address potential endogeneity (eg, preexisting psychiatric disorder or genetic vulnerability as a common cause of material deprivation and suicide) and (2) suicide-related mortalities are rare outcomes in individual-level cohort studies and could result in an underpowered statistical analysis. Furthermore, observational studies cannot be used to infer the effectiveness of social protection programmes as part of suicide prevention strategy.

Randomised controlled trials (RCTs, ie, experimental studies) can resolve these limitations by ensuring that treatment assignment is exogenous (through random assignment). Exogeneity of exposure can help rule out selection bias and confounding since the exogenous exposure (eg, through random assignment) is not influenced by the outcome of interest or any variable associated with the outcome. Despite the high-quality standards of RCTs, they are difficult to conduct in non-clinical settings, since suicide events are extremely rare. Where manipulation to the exposure is not an option, quasi-experimental studies (ie, natural experiments) can be a viable alternative for causal inference since exogeneity can be established through other means such as through nature, policy and practice.^{12 13} For example, the exogenous variation could be changes in levels of income driven by legislation and implementation of social protection programmes. Thus, recent studies have used exogenous variations in the time and the extent of the benefit level, naturally generated by the legislation of social protection programmes to identify the causal effects of increased income on suicide mortality.^{14 15}

Although a growing body of literature examines the role of social and economic policy on suicide, there has been only one narrative review of the relationship between social protection programmes and suicide.¹⁶ Social protection programmes include: however, the previous review (1) included studies that did not use quasi-experimental or RCT designs, and (2) did not evaluate quality of evidence; therefore, it had limited ability to provide evidence for causal inference. To address these limitations, our review will aim to identify all existing RCTs and quasi-experimental studies that examine social protection programmes conducted since 1980 on suicide mortality. We will only focus on mortality since individual-level socioeconomic positions may have a differential impact on non-fatal (eg, suicidal ideation and attempts) and fatal suicidal events.¹⁷ Our systematic review of RCT and quasi-experimental studies on the impact of social protection programmes on suicides will have

the following objectives: (1) to provide evidence to support the decision-making process with regards to the implementation of social protection programmes as a core part of suicide prevention strategy and (2) to establish the broader effect of income on suicide by exploiting income security programmes as an exogenous shift. Our systematic review will answer the following research question: do social protection programmes have a causal effect on suicide mortality?

METHODS

Patient and public involvement

Patients and/or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

We conducted preliminary searches in May 2021 and registered the current protocol on the PROSPERO database on 4 May 2021. The current review protocol is written according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols guidelines. Revision history and any amendment to the protocol are available through PROSPERO. The review will start in December 2021.

Definitions of key terms

Intervention: social protection programmes

Social protection programmes in the review are based on the widely recognised definition from Norton *et al*, which includes public actions that address ‘the deprivation and vulnerabilities of the poor, and also with the needs of the non-poor for security in the face of shocks and the particular demands of different stages of the life cycle’ (p22).¹⁸ We also drew on a synthesised report (funded by the UK Department for International Development) aimed at

summarising the evidence base on when and how social protection programmes can be used to minimise negative shocks in the global context.¹⁹ Specifically, according to the report, social protection programmes consist of social assistance (ie, unremarkable tax-financed transfers in cash, vouchers or in-kind; fee waivers and subsidies), social insurance (ie, contributory schemes providing support in the event of contingencies, such as illness, injury, unemployment, old age and disability), social care services for individuals facing risks of social exclusion, and active (ie, strengthening skills and competencies to promote labour market participation) and passive (ie, ensuring minimum employment standards) labour market programmes. The specific programmes and policies with general terms and synonyms related to social protection programmes are presented in figure 1, and have been derived from a prior synthesis report.²⁰

Method: RCTs (ie, experimental study) and quasi-experimental studies

Our review will include both RCT and quasi-experimental studies. RCT refers to a form of intervention study in which participants are assigned to the intervention at random, assuming that all aspects other than assignment of the intervention are identical. The purpose of random assignment in an experimental study is to ensure both treatment and control groups are equivalent so that any preexisting attribute does not affect the outcome or any factor associated with the outcome (ie, to achieve exogeneity).²¹ Although treatment is not randomly assigned, a well-defined quasi-experimental study can achieve exogeneity through a ‘force of nature’²¹ (ie, where the occurrence of an event with a natural cause) or a policy change

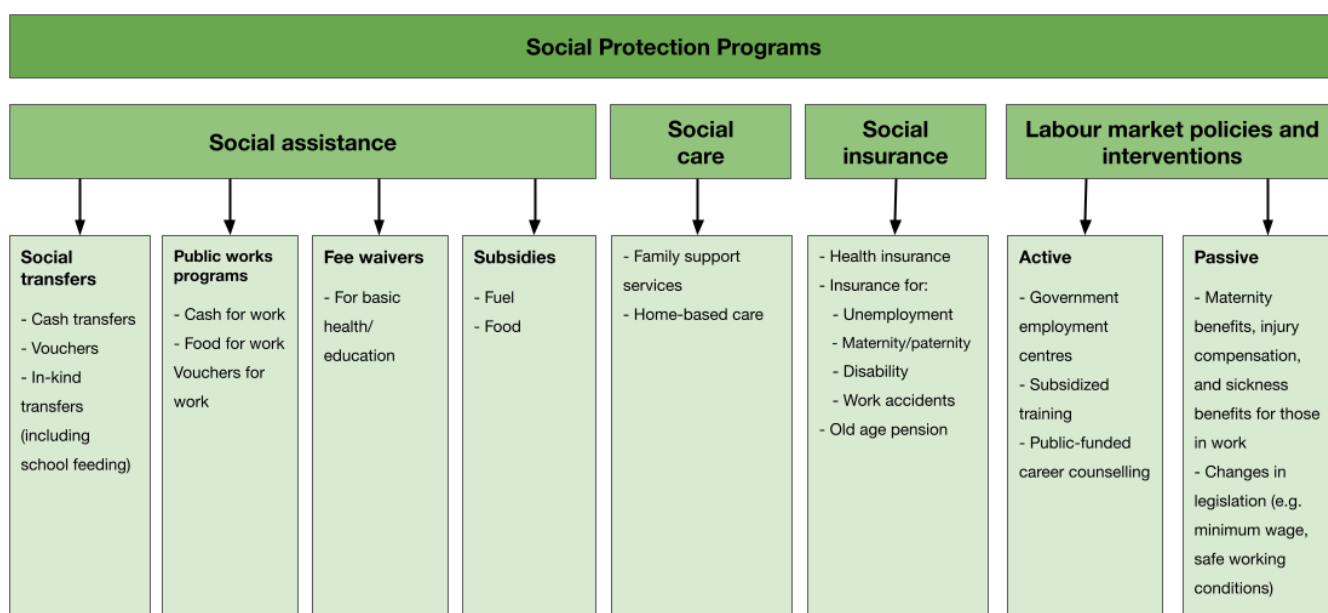


Figure 1 Subtypes of social protection programmes, modified figure adapted from O'Brien *et al*.²⁰

(ie, where exposure is allocated without the deliberate manipulation by researchers²¹).

Suicide mortality

Suicide mortality refers to deaths from intentional self-harm, extracted using the International Classification of Diseases V.10 (ICD-10) is coded as X60–X84. We additionally include any (subset) of the following codes as potential suicide mortality: Y10–Y34 (undetermined deaths) and Y87.0 (sequelae of intentional self-harm, assault and events of undetermined intent). Many previous studies^{22–24} have included undetermined deaths and sequelae of intentional self-harm as suicide mortality outcome because prior studies found that a large proportion of them are misclassified suicide cases. For instance, there is strong evidence that injury-related and poisoning-related undetermined deaths are likely to be suicides. Therefore, we included studies that used a broader definition of suicide outcomes, beyond X60–X84. For studies published before the release of the ICD-10, the above codes will be matched to the ICD-8 and ICD-9 equivalents. We will not exclude a study if ICD codes were not used. If a study does not use ICD or other standardised diagnostic codes at the full text review stage, we will try our best to match what is written in the paper to the above ICD definition (eg, contacting the author to confirm whether the deaths included in the study matches with the definitions we used above). Variability in the identification of suicides will be noted in the results of the review.

Eligibility criteria

We will include all published studies, preprint studies and dissertations written in English. Studies in low-income, middle-income and high-income countries will be included. We will exclude studies that evaluated healthcare-related programmes or policy (eg, medical subsidy, Medicare and drug subsidy). While transfers and benefits directly related to healthcare utilisation are excluded, the use of eligibility for these subsidies as a criterion for other transfers and benefits is acceptable. For example, in South Korea, a medical aid programme, which provides medical service for the bottom 3%–4% of households of income, is often used as a means-testing criteria for social protection programmes.²⁵ Studies conducted prior to 1980 are excluded. Studies that do not have a specific government or non-government funded intervention or policy, such as those that investigated the impact of general macroeconomic changes (eg, economic boom or recession) will not be included since these changes are not considered exogenous that can be tested using causal inference (ie, quasi-experimental methods).

Search strategy

Databases

Starting December 2021, the reviewers will use the following 10 databases to search for studies published between 1 January 1980 and 30 November 2021: MEDLINE

Table 1 Key terms for social protection interventions and policies

Types of social protection programmes	Specific programmes/policies or synonyms
Social assistance	Social transfer, public works programme, fee waiver, housing support, housing benefit, housing subsidy, public housing, welfare, social policy, social assistance, social security, food stamp, food assistance, food aid, in-kind transfer, disability benefit, family allowance, child benefit, income benefit, income supplement, income support, income maintenance, cash transfer, income security, basic income, guaranteed income and cash-like transfers
Social care	Social care, family support, childcare, eldercare, residential care and home care
Social insurance	Unemployment insurance, employment insurance, pension, sickness benefit, income benefit and injury compensation
Labour market programmes	Minimum wage, (earned) income tax credit, maternity benefits, active labour market, employment service, wage subsidy, vocational training, job-search services and work sharing
Other related terms	Austerity, deaths of despair and poverty reduction

(PubMed), PsycINFO, EMBASE, Applied Social Sciences Index, Grey Literature Report, Scopus (Elsevier), the Cochrane Central Register of Controlled Trials, ProQuest Dissertation Database, EconLit and Research Papers in Economics. The electronic databases were selected for relevance to the research question as well as being frequently used in systematic literature searches. We will conduct additional hand-searching for references in relevant studies and key journals.

Search terms

The two search terms for suicide-related studies include *suici** and *self-harm* to ensure that studies examining suicide mortality are captured. The search terms for social protection were identified based on the goal of covering a range of specific programmes that fall under our definition of a social protection programme, and have been identified through previous literature.^{4 26} For the purposes of presenting and organising the terms, social protection programmes are categorised into the following five groups based on a prior study (see [table 1](#)): labour market programmes, targeted social assistance, social insurance, other conditional/unconditional cash/cash-like transfers and general programmes. Related terms and specific modelling related to RCT and quasi-experimental studies are listed below (see [table 2](#)). See online supplemental file 1 for detailed instructions on how these terms are operationalised in each database.

Table 2 Search terms for RCT and quasi-experimental studies

Study specifications	Related terms
Quasi-experimental study	Natural experiment, quasi-experiment, non-randomised, instrument, interrupted time series, propensity score, sharp design, fuzzy design, matched control, synthetic control, regression discontinuity and inverse probability weight
Randomised experimental study (RCT)	RCTs, randomised control trials, RCT, field experiment, experiment, social experiment and random
Terms for either RCT or quasi-experimental studies	Sibling, Mendelian randomisation, controlled before and after, difference in difference, difference study, exogenous variation, counterfactual, Rubin causal model and potential outcome

RCT, randomised controlled trial.

Study selection

We will import all the citations to a citation manager (ie, Zotero) for deduplication and then to an online software programme for systematic review (ie, Covidence) for screening. At stage 1, all authors (AC, CK, CT, KA, AN, ZB and TY) will screen all of the titles and abstracts to identify relevant studies by checking whether the target programme, outcome and methods were used. Each title and abstract are required to be screened by two authors, and any discrepancies that arise will be resolved through a discussion between all authors on its relevance based on the inclusion/exclusion criteria. At stage 2, another reviewer (CK) will screen a random sample of studies that were excluded at stage 1 with no discrepancies (ie, a 10% sample of the excluded studies). Any studies that are identified as inappropriately excluded at stage 1 will be discussed among CK, ZB, KA and AN, with another reviewer (AC) intervening to resolve any arising discrepancy. At stage 3, for the chosen studies screened through titles and abstracts, all team members will be working collaboratively to review the full texts (comparing results throughout the process), assess the eligibility of the texts and then appraise the quality of the included studies where results are determined by consensus. We will contact the authors if additional study information is required.

Strategy for data synthesis

Data extraction

We will create a table to provide a clear description of the data extracted from the selected studies, which will include the authors, years of publication, titles, populations, designs, data sources, data years, analytic approaches and results (see online supplemental file 2). The effect sizes and quality of the studies will be reviewed

and critiqued. Data will be extracted by ZB, KA, AN and TY.

Risk of bias (quality) assessment

All authors will use Cochrane Collaboration risk of bias (RoB) V.2.0 tool²⁷ for RCTs and the ROBINS-I (“Risk of Bias in Non-randomised Studies - of Interventions”) for quasi-experiments and natural experiments²⁸ (see online supplemental file 3), for the final set of included studies after the full-text screening. Any disagreements will be discussed and resolved by another reviewer (AC). The RoB V.2.0 analyses six domains: random sequence generation, allocation concealment, blinding of patients and personnel, blinding of outcome assessor, incomplete outcome data and selective outcome reporting. The ROBINS-I consists of seven components assessing the following: bias due to confounding, selection of participants, classification of interventions, departure from intended interventions, missing data, measurement of outcomes and selection of reported results.

Systematic narrative review and meta-analysis

We will provide a summary table of the included studies with effect sizes and details on programme specifications. We will consider each programme’s economic contexts (eg, low-income or middle-income or high-income countries), study design (eg, use of individual-level or population-level data), types of programme (eg, universality, delivery and conditionality) and underlying mechanisms, and use this information to analytically categorise these programmes. The results will be summarised separately for each programme category. Based on these factors, if we have at least three studies of a similar programme, we will perform a meta-analysis. Otherwise, only a systematic narrative review will be performed. If we can conduct a meta-analysis, we will examine the heterogeneity of studies, and their sources, and conduct a fixed-effects or random-effects model based on the level of heterogeneity. We will also check for publication bias, and perform sensitivity analyses if necessary. All statistical analyses will be conducted using R. The strength of the body of evidence will be assessed using the Grading of Recommendations, Assessment, Development and Evaluations framework.

Ethical considerations and disseminations

Ethical approval is not required for the present study since the review will be a synthesis of existing secondary data. In collaboration with our community partners, we will develop a policy brief for key stakeholders. Therefore, the study will provide policy-makers with evidence to modify or implement social protection programmes to prevent suicides. Findings from the review can be used to inform future research such as impact evaluation of social protection programmes. Our findings will be presented at international conferences and published in a peer-reviewed journal. The findings will also be promoted through social media platforms, such as Twitter and YouTube.



DISCUSSION

The proposed systematic review will be the first to summarise the causal effects of social protection programmes on suicide mortality based on prior RCTs and quasi-experiments. Our review has the following policy and theoretical implications: first, evidence from our study could be used to support multisectoral suicide prevention strategies by clarifying the role of social protection programmes as a core component of these strategies in low-income–high-income countries. We recognise the numerous ways in which social protection programmes are implemented, and we include a wide range of these programmes to ensure a comprehensive review of relevant studies. Second, the review will contribute to a richer theoretical understanding of the causal impacts of income (ie, economic security) on suicide. By examining exogenous changes in income within RCTs and quasi-experimental studies, we can help identify possible causal links and mechanisms between income and suicide risk. In addition, to ensure that our findings reflect a valid representation of existing evidence, our study design is compliant with recommended and validated methods guidelines and will adhere to a systematic and transparent approach.

The proposed review has some limitations that we will take into consideration. First, since our review will include a range of different social protection programmes, there is a greater chance that we will find heterogeneous effects. Nevertheless, we believe the need to review the range of selected studies is significant to suicide prevention policy development. Second, reviews of secondary data may have publication bias, where published studies are more likely to report significant findings rather than null findings. We will minimise the publication bias risk by trying to find unpublished studies (eg, grey literature and dissertations) and conduct additional hand-searching in references. Funnel plots will be included to visually identify the presence of potential bias. Third, the review is limited to only include studies published in seven languages, which may exclude studies published in other languages.

CONCLUSION

While traditional suicide prevention strategies have focused on individual-level and clinical interventions, social protection programmes may offer a unique solution to further reduce suicides. However, the current lack of evidence on their efficacy may be a barrier to their wider implementation. Our review will evaluate the evidence of a causal relationship between social protection programmes and suicide mortality, which may provide strong evidence for shaping the future of suicide prevention strategies.

Contributors CK conceived the idea. CK, CT, KA, AN, ZB and TY drafted the manuscript. AC provided feedback. CT, AN and TY contributed to the quality appraisal assessment strategy and data extraction criteria. CK, KA, AC and ZB developed the search strategy. All authors provided comments and amendments.

All authors (CK, CT, KA, AC, AN, ZB and TY) contributed to the development of the selection criteria and approved the final manuscript.

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REFERENCES

- Saxena S, Krug EG, Chestnov O, eds. *Preventing suicide: a global imperative*. Geneva: World Health Organization, 2014.
- Mishara BL, Weisstub DN. The legal status of suicide: a global review. *Int J Law Psychiatry* 2016;44:54–74.
- Cairns J-M, Graham E, Bamba C. Area-level socioeconomic disadvantage and suicidal behaviour in Europe: a systematic review. *Soc Sci Med* 2017;192:102–11.
- Sun S, Huang J, Hudson DL, et al. Cash transfers and health. *Annu Rev Public Health* 2021;42:363–80.
- ILO. *Economic security for a better world*. International Labour Organization, 2004.
- Stone DM, Holland KM, Bartholow B. *Preventing suicide: a technical package of policies, programs, and practices*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 2017.
- O'Connor RC, Pirkis J, eds. *The international handbook of suicide prevention*. Chichester, UK: John Wiley & Sons, Ltd, 2016.
- Li Z, Page A, Martin G, et al. Attributable risk of psychiatric and socio-economic factors for suicide from individual-level, population-based studies: a systematic review. *Soc Sci Med* 2011;72:608–16.
- Iemmi V, Bantjes J, Coast E, et al. Suicide and poverty in low-income and middle-income countries: a systematic review. *Lancet Psychiatry* 2016;3:774–83.
- Knipe DW, Carroll R, Thomas KH, et al. 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.
- Turecki G, Brent DA. Suicide and suicidal behaviour. *Lancet* 2016;387:1227–39.
- Bärnighausen T, Tugwell P, Röttingen J-A, et al. Quasi-experimental study designs series—paper 4: uses and value. *J Clin Epidemiol* 2017;89:21–9.
- Frenk J, Gómez-Dantés O. Quasi-experimental study designs series—paper 3: systematic generation of evidence through public policy evaluation. *J Clin Epidemiol* 2017;89:17–20.
- Dow WH, Godoy A, Lowenstein C, et al. Can labor market policies reduce deaths of despair? *J Health Econ* 2020;74:102372.
- Kaufman JA, Salas-Hernández LK, Komro KA, et al. Effects of increased minimum wages by unemployment rate on suicide in the USA. *J Epidemiol Community Health* 2020;74:219–24.
- Kim C. The impacts of social protection policies and programs on suicide: a literature review. *Int J Health Serv* 2018;48:512–34.
- Kim M-H, Jung-Choi K, Jun H-J, et al. Socioeconomic inequalities in suicidal ideation, parasuicides, and completed suicides in South Korea. *Soc Sci Med* 2010;70:1254–61.

- 18 Norton A, Conway T, Foster M. *Social protection concepts and approaches: implications for policy and practice in international development*. Citeseer, 2001.
- 19 Watson C, Lone T, Qazi U. *Shock-Responsive social protection systems research*. Oxford, 2017.
- 20 O'Brien C, Scott Z, Smith G. *Shock-Responsive social protection systems research: synthesis report*. Oxford, UK: Oxford Policy Management, 2018.
- 21 de Vocht F, Katikireddi SV, McQuire C, et al. Conceptualising natural and quasi experiments in public health. *BMC Med Res Methodol* 2021;21:32.
- 22 Björkenstam C, Johansson L-A, Nordström P, et al. Suicide or undetermined intent? A register-based study of signs of misclassification. *Popul Health Metr* 2014;12:1–11.
- 23 Mittendorfer-Rutz E, Rasmussen F, Wasserman D. Restricted fetal growth and adverse maternal psychosocial and socioeconomic conditions as risk factors for suicidal behaviour of offspring: a cohort study. *Lancet* 2004;364:1135–40.
- 24 Burrows S, Auger N, Gamache P, et al. Influence of social and material individual and area deprivation on suicide mortality among 2.7 million Canadians: a prospective study. *BMC Public Health* 2011;11:1–11.
- 25 Yoo K-B, Ahn H-U, Park E-C, et al. Impact of co-payment for outpatient utilization among medical aid beneficiaries in Korea: a 5-year time series study. *Health Policy* 2016;120:960–6.
- 26 Simpson J, Brown H, Bell Z, et al. Investigating the relationship between changes in social security benefits and mental health: a protocol for a systematic review. *BMJ Open* 2020;10:e035993.
- 27 Sterne JAC, Savović J, Page MJ, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. *BMJ* 2019;366:i4898.
- 28 Sterne JA, Hernán MA, Reeves BC, et al. ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. *BMJ* 2016;355:i4919.