IN THE HIGH COURT OF SOUTH AFRICA

GAUTENG DIVISION, PRETORIA

CASE NUMBER 2025-125411

In the application between:

THE MINISTER OF HEALTH	First Applicant
THE DIRECTOR GENERAL, NATIONAL DEPARTMENT OF HEALTH	Second Applicant

and

THE PRESIDENT OF THE REPUBLIC OF SOUTH AFRICA	First Respondent
THE MINISTER OF FINANCE	Second Respondent
NATIONAL TREASURY	Third Respondent
SOLIDARITY TRADE UNION	Fourth Respondent
BOARD OF HEALTHCARE FUNDERS OF SOUTHERN AFRICA NPC	Fifth Respondent
SOUTH AFRICAN PRIVATE PRACTITIONERS FORUM	Sixth Respondent
HOSPITAL ASSOCIATION OF SOUTH AFRICA	Seventh Respondent
THE SOUTH AFRICAN MEDICAL ASSOCIATION NPC	Eighth Respondent
HEALTH FUNDERS ASSOCIATION	Ninth Respondent
SAKELIGA NPC	Tenth Respondent

In re:

Case No: 2024-057449

SOLIDARITY TRADE UNION	Applicant
and	
THE MINISTER OF HEALTH	First Respondent
THE PRESIDENT OF THE REPUBLIC OF SOUTH AFRICA	Second Respondent
THE DIRECTOR GENERAL, NATIONAL DEPARTMENT OF HEALTH	Third Respondent
THE MINISTER OF FINANCE	Fourth Respondent
NATIONAL TREASURY	Fifth Respondent

And in re:

Case No: 2024-058172

BOARD OF HEALTHCARE FUNDERS OF SOUTHERN AFRICA NPC	Applicant
and	
THE PRESIDENT OF THE REPUBLIC OF SOUTH AFRICA	First Respondent
THE MINISTER OF HEALTH	Second Respondent

And in re:

Case No: 2024-11209

SOUTH AFRICAN PRIVATE PRACTITIONERS FORUM	Applicant
and	
THE PRESIDENT OF THE REPUBLIC OF SOUTH AFRICA	First Respondent
THE MINISTER OF HEALTH	Second Respondent
THE MINISTER OF FINANCE	Third Respondent
NATIONAL TREASURY	Fourth Respondent

And in re:

Case No: 2025-020969

HOSPITAL ASSOCIATION OF SOUTH AFRICA	Applicant
and	
THE MINISTER OF HEALTH	First Respondent
THE MINISTER OF FINANCE	Second Respondent
THE PRESIDENT OF THE REPUBLIC OF SOUTH AFRICA	Third Respondent

And in re:

Case No: 2025-045340

THE SOUTH AFRICAN MEDICAL ASSOCIATION NPC	Applicant
and	
THE MINISTER OF HEALTH	First Respondent
THE PRESIDENT OF THE REPUBLIC OF SOUTH AFRICA	Second Respondent
SPEAKER OF THE NATIONAL ASSEMBLY	Third Respondent
CHAIRPERSON OF THE NATIONAL COUNCIL OF PROVINCES	Fourth Respondent

And in re:

Case No: 2025-083348

HEALTH FUNDERS ASSOCIATION	Applicant
And	
THE MINISTER OF HEALTH	First Respondent
THE MINISTER OF FINANCE	Second Respondent
NATIONAL TREASURY	Third Respondent
PRESIDENT OF THE REPUBLIC OF SOUTH AFRICA	Fourth Respondent

And in re:

Case No: 2025-134493

SOUTH AFRICAN PRIVATE PRACTITIONERS FORUM	Applicant
and	
MINISTER OF HEALTH	First Respondent
PRESIDENT OF THE REPUBLIC OF SOUTH AFRICA	Second Respondent
MINISTER OF FINANCE	Third Respondent
NATIONAL TREASURY	Fourth Respondent

And in re:

Case No: 2025-147065

SAKELIGA NPC	Applicant
and	
MINISTER OF HEALTH	First Respondent
MINISTER OF FINANCE	Second Respondent
PRESIDENT OF THE REPUBLIC OF SOUTH AFRICA	Third Respondent
SPEAKER OF THE NATIONAL ASSEMBLY	Fourth Respondent
CHAIRPERSON OF THE NATIONAL COUNCIL OF PROVINCES	Fifth Respondent

SAKELIGA'S REPLYING AFFIDAVIT:

CONDITIONAL COUNTER-APPLICATION

I, the undersigned,

RUSSELL VICTOR LAMBERTI

hereby make oath and say that:

1. I am the same deponent that deposed to the answering affidavit on behalf of Sakeliga with full and further particulars set out therein (at p 009-16).

2. The facts in this affidavit are true and correct. Such facts fall within my personal knowledge, unless otherwise indicated or where the contrary is evident from the context hereof. Where I make legal submissions herein, I do so on the advice of the legal representatives of Sakeliga.

3. I remain duly authorised to oppose the stay and consolidation application on behalf of Sakeliga and to institute the conditional counter-application, delivered together with Sakeliga's answering affidavit, on behalf of Sakeliga.

4. I have read the supplementary replying affidavit deposed to by **NICHOLAS GILMOUR CRISP** ("**Dr Crisp**"), on behalf of the first and second applicants, and the answering affidavit of **GEOFREY MPHAPHULI**, on behalf of the President, in the counter-application. I reply to both of these affidavits herein

below.

5. As far as reasonably possible, I adopt in the present affidavit the same terms as defined in the founding affidavit read with the answering affidavit of Sakeliga. I will refer to the first and second applicants, collectively, as "**the Minister**".

A. THE ALLEGATIONS IN THE MINISTER'S AND PRESIDENT'S AFFIDAVITS

6. I will now deal *seriatim* with certain allegations contained in the Minister's supplementary replying affidavit, as well as the President's answering affidavit in the counter-application. Insofar as any allegation, conclusion or inference drawn in any of these affidavits is inconsistent with what is stated in the answering affidavit of Sakeliga or this affidavit, such allegation, conclusion or inference is denied.

(a) The Minister's supplementary replying affidavit (commencing at p 010-223)

Ad paragraph 27 thereof

7. The content of this paragraph is denied.

8. Dr Crisp describes Sakeliga's claims as "*exaggerated*" and "*little more than fear-mongering based on speculative figures.*"

9. The calculations conducted by PriceMetrics, which Sakeliga relies on, are based on the government's own figures, adjusted for inflation and population growth (Sakeliga's answering affidavit, para 26, p. 009-27).

10. Dr Crisp's description of the government's own figures as "speculative" amounts to a concession of the irrationality of the NHI Act and that Parliament was not provided with accurate figures in support of its adoption of the NHI Act.

11. Even so, Dr Crisp refuses to provide any evidence to dispute PriceMetrics' calculations and conclusions, and both he and the Minister have, once again, merely ridiculed the figures put up by the respondents. While such an approach may work in the field of political communication, it does not discharge the evidentiary burden placed on the Minister and is impermissible in a court of law.

12. I point out that the Minister does not need to appoint experts now in order to produce such calculations. This ought to have been done at the deliberation stage of the NHI Bill and ought to have been readily available to the Minister and presented to Parliament.

Ad paragraph 29 thereof

13. The content of this paragraph is denied.

14. I am surprised that the Minister and Dr Crisp describe the predictable

outcomes expressed by Sakeliga as "*wild and grossly exaggerated outcomes*".

15. By way of example, I refer to:

15.1. A paper titled "*A Public Health Approach to Suicide Prevention 3: The effect of economic downturn, financial hardship, and relevant government responses on suicide*" authored by Mark Sinyor, Morton Silverman, Jane Pirkis and Keith Hawton and published on 9 September 2024 in the Lancet Public Health journal, a copy of which is attached, marked "**SLR1**". While this article explores government responses to reduce the adverse effect of economic downturn on suicide rates, the article acknowledges that:

> *"The relationship between socioeconomic conditions and suicide is complex. Suicide rates are often higher in groups that experience economic disadvantage, including financial hardship and unemployment. The integrated motivational–volitional model of suicidal behaviour identifies defeat and humiliation, entrapment, lack of belongingness, and perceived burdensomeness as key precursors to suicidal thinking; some or all of these psychological processes might be at play for those who are economically disadvantaged. A 2022 review of studies showed that increased general measures of economic hardship (eg, economic recession and unemployment) and, specifically, changes in aggregate consumption (ie, the amount of consumer spending in relation to disposable income across an economy) were associated with increased suicide rates."*

(Own emphasis)

15.2. A paper titled "*Economic activity and suicides: Causal evidence from macroeconomic shocks in England and Wales*", authored by Gabriele M. Lepori, Sara Morgan, Borna A. Assarian, Tapas Mishra, and published in Social Science & Medicine, Volume 342, 2024, a copy of which is attached, marked "**SLR2**", the authors study the causal link between economic activities and suicide and state that:

"Overall, our results are consistent with economic theory that shocks that reduce estimated permanent income, and therefore expected lifetime utility, can propel suicide rates. Specifically, at the population level, negative shocks to consumer confidence and house prices accelerate the suicide rate. However, there is evidence of behavioural heterogeneity between sexes, states of the economy, and levels of public trust in government. Negative shocks to the retail price index (RPI) raise the suicide rate for males. Negative shocks to the growth rate in gross domestic product (GDP) raise the population suicide rate when the economy is doing poorly. When public trust in government is low, increases in the unemployment rate increase the suicide rate for females."

15.3. A paper titled "*How economic recessions and unemployment affect illegal drug use: A systematic realist literature review*", authored by Gera E. Nagelhout, Karin Hummel, Moniek C.M. de Goeij, Hein de Vries, Eileen Kaner, Paul Lemmens, and published in the International Journal of Drug Policy, Volume 44, 2017, a copy of which is attached,

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marked "**SLR3**", the authors study the causal link between economic activities and suicide and conclude that:

> *"The current evidence is in line with the hypothesis that drug use increases in times of recession because unemployment increases psychological distress which increases drug use. During times of recession, psychological support for those who lost their job and are vulnerable to drug use (relapse) is likely to be important."*

16. These are but a few examples of a plethora of research in these respects. The outcomes anticipated by Sakeliga are neither exaggerated nor fear-mongering but based on widely accepted economic and medical research. I respectfully remind the court that PriceMetrics' modelling shows a major and long-term reduction in economic output under a fully implemented NHI Act, adding further force to this body of research.

Ad paragraphs 30 to 32 thereof

17. The content of these paragraphs is denied.

18. Promulgation does not equal implementation. Furthermore, the Minister's attempt to indefinitely stall the Constitutional challenges in this court has only been raised recently. The Minister conflates urgency with the conditional counter-application which only arises if the court is minded to grant a stay. The conditional counter-application will protect the *status quo* as the litigation winds its way through the courts and ensure that the Minister's and President's concerns of a waste of financial resources are adequately protected should

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this litigation become moot.

19. The Minister has obstinately refused to acknowledge the economic harm which the implementation of NHI poses to South Africa's economy. The evidence is overwhelming in this regard.

20. Any changes to the state health system based on the implementation of the NHI Act rely on the promulgation of the NHI Act as the statutory basis for such changes. If the NHI Act is declared invalid, for whatever reason, any changes brought about will necessarily have to be undone and revert to the current system. It is thus entirely sensible and prudent to maintain the *status quo*.

21. As stated before, there is nothing within the existing framework of the National Health Act 61 of 2003 that prevents or prohibits the Minister from "strengthening" the existing state health system. The Minister's refusal to do so is a dereliction of duty, and the NHI Act is not a "silver bullet" that will magically transform an ailing state health system into a functional one.

22. The NHI Act aims to make significant, structural changes to the health care system in South Africa. If implemented, the initial steps of the NHI Act will drastically disrupt the current state health system. It is therefore reasonable to expect that numerous changes arising from the implementation of the NHI Act will be extremely difficult and costly to both implement and to reverse.

23. It is a myth that the implementation of the NHI Act will enhance health care services for the vulnerable groups mentioned in the NHI Act. At present, the

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Minister is already charged with doing this under the National Health Act. For example:

23.1. Section 3(1)(e) of the National Health Act mandates the Minister to equitably prioritise the health services that the state can provide;

23.2. Section 4 empowers the Minister, after consultation with the Minister of Finance, to prescribe conditions subject to which categories of persons are eligible for free health care services at public health establishments;

23.3. In prescribing any such condition, the Minister must have regard to *inter alia* the needs of vulnerable groups such as women, children, older persons and persons with disabilities (section 4(2)(d) of the National Health Act).

Ad paragraphs 33 and 34 thereof

24. I deny that the allegations made in my answering affidavit are scandalous, vexatious or irrelevant. These remarks are warranted given the Minister's and Dr Crisp's conduct and statements.

Ad "SAKELIGA'S CONDITIONAL COUNTER-APPLICATION"

Ad paragraph 65 thereof

25. I note the basis of the Minister's opposition to the conditional counter-application, but deny that such grounds have merit.

Ad "The interdict is prevented by the provisions of the NHI Act and the Constitution"

Ad paragraphs 66 to 68 thereof

26. The content of these paragraphs is denied.

27. The fallacy in the contention is exposed by the passage of time and the fact that the state functionaries have to date not brought the NHI Act into effect. The period of the first phase is practically at its end. The further difficulty with this ground of opposition is that the Minister is treating the NHI Act, and specifically section 57 thereof, as if such sections are already in effect and have the force of law, which they do not.

28. The NHI Act, while signed into law, has not yet taken effect. In terms of section 59 of the NHI Act, the NHI Act will only take effect on a date fixed by the President by proclamation in the Government Gazette. This accords with sections 81 and 85(2)(a) and (e) of the Constitution.

29. Sakeliga is advised that there are numerous examples of statutory provisions which have been promulgated but which have not yet taken effect, as the President has not fixed a date by proclamation in the Government Gazette. For example, one such provision is section 72 of the Mineral and Petroleum Resources Development Amendment Act 49 of 2008.

30. Accordingly, the President and the Minister are not bound by the timelines set out in the NHI Act, as such provisions do not yet have the force of law.

31. There is thus nothing in the NHI Act nor the Constitution which obliges the President to fix a date on which the NHI Act will take effect and, notwithstanding the provisions of section 57 of the NHI Act, Parliament has left this to the discretion of the President.

32. In the event that the court grants a stay, there is no reason why the *status quo* ought not be preserved pending the determination of the constitutional challenges.

Ad "The relief is imprecise and overbroad"

Ad paragraphs 69 to 71 thereof

33. The content of these paragraphs is denied.

34. It is astonishing to suggest that, should the interdict sought in the conditional counter-application be granted, such an interdict would not prohibit the

National Department of Health (of which the Minister is the head) and other state functionaries (of which the President is the head as the head of the executive) from implementing an Act which is not in effect.

35. Preparatory steps are exactly that, preparatory in anticipation of the coming into effect of the Act. This is a far cry from the implementation of the NHI Act.

36. Prayer 1 of the notice of counter application is clear, and quite clearly conditionally seeks an interim order for the duration of the stay of the applications.

Ad "The relief undermines the very purpose of the stay application"

Ad paragraphs 72 to 74 thereof

37. I deny that the relief sought in the conditional counter application undermines the purpose of the stay application.

38. As stated above, the Minister and the Department of Health ought to have already had this information at their disposal and to be able to provide an answer thereto. The fact that they do not is damning. In fact, in February 2025, it was reported in the media that the Minister of Finance informed the Minister that if he wants NHI implemented, then he must come up with a figure for it, failing which, the Minister of Finance could not budget for it. A copy of this article titled *"No budget for NHI without price tag – Finance Minister"* as reported in the Juta Medical Brief is attached, marked "**SLR4**".

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39. The Minister's objection based on his own election not to meet the grounds of opposition set out by Sakeliga is without merit. This is no impediment to the grant of the interdict sought in the conditional counter-application.

40. On the contrary, the granting of such an interdict accords with the Minister's and the President's reasons for seeking a stay of proceedings.

Ad "Sakeliga has failed to justify the conditional counter-application or to meet the requisites for an interim interdict"

Ad paragraphs 75 to 84 thereof

41. The content of these paragraphs is denied.

42. Sakeliga has properly and adequately set out the grounds for seeking such an interdict in its answering affidavit.

43. As stated above, there is nothing preventing the Minister from addressing the problems faced in the state and private health sectors within the existing legislative frameworks. These problems are failings of governance, not of legislation.

44. If the Minister is concerned with delay in implementing the "reforms", including the NHI Act, why seek to delay the constitutional challenges rather than addressing them head-on?

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45. The entire basis of the Minister's application for a stay is to prevent financial loss should this litigation be rendered moot. If this is truly the Minister's motivation, then the Minister ought to have no objection to the interim interdict in respect of the implementation of the Act with all of the attendant cost and harm that shall be incurred in the event that the litigation is rendered moot.

46. Procurement harmonisation and digital integration do not require the NHI Act. Indeed, the NHI Act's version of 'procurement harmonisation' will only result in a veritable honeypot for corruption and plundering.

47. The evidence relied upon by Sakeliga includes expert evidence and econometric modelling and forecasting. The methods used by PriceMetrics are orthodox mainstream modelling methods, consistent with standard macroeconomic forecasting approaches.

Ad "Sakeliga's answering affidavit"

Ad paragraph 87 thereof

48. The content of this paragraph is denied. Sakeliga persists with the grounds in its constitutional challenge.

Ad paragraphs 88 to 90 thereof

49. The content of these paragraphs is denied.

50. Sakeliga has not attempted to pre-emptively litigate the merits of its application but has demonstrated that its constitutional challenge has good prospects of success.

Ad paragraph 91 thereof

51. The content of this paragraph is denied.

52. Sakeliga's answering affidavit presents the findings of PriceMetrics, which conducted a comparative international review of South Africa and 16 countries with single-payer health care funding systems.

53. The report lists several criteria that a successful comprehensive single-payer system generally must meet, including:

53.1. a high GDP per capita, defining the country as a high-income country;

53.2. a strong fiscal capacity that provides sufficient and efficiently collected tax revenue; and

53.3. comprehensive health care resources, including professionals and infrastructure.

54. This is not correlation versus causation. PriceMetrics does not argue in its report that such conditions "cause" successful single-payer systems, but that they are necessary, or permissive, for such systems to be substantively

implemented and produce sustained, high-quality health care outcomes. The sufficiency of these conditions was not established in the study, implying that they should be regarded as a minimum set of necessary conditions rather than a sufficient set. The PriceMetrics reports explicitly use the language of necessity and set out the conditions that must be met to define the success, viability, and attainment of a comprehensive single-payer system. This is a necessity-based comparative analysis deriving from 16 countries' data.

55. Importantly, the PriceMetrics study shows that while the conditions are necessary for successful, high-coverage single-payer systems to be implemented, single-payer systems are *not* necessary for the achievement of universal health care coverage. Many countries achieve among the highest levels of health care coverage in the world – higher than several single-payer systems – with multi-payer or hybrid systems. Moreover, the PriceMetrics study shows that other middle-income countries with similar resource challenges to South Africa have managed to achieve very high levels of health care coverage without single-payer models and their concomitant extreme resource demands.

Ad paragraph 92 thereof

56. The content of this paragraph is denied.

57. The claim of a "general consensus" is extraordinary and wholly unsubstantiated.

58. Single-payer systems are rare and do not exist outside high-income countries.

59. As stated in paragraph 24 of the PriceMetrics report, attached as SL1 to Sakeliga's answering affidavit:

> *"...a single-payer system is not necessary to achieve universal health coverage. Other systems, including multi-payer and hybrid systems (Australia), have also achieved high levels of UHC."*

Ad paragraph 93 thereof

60. The content of this paragraph is denied.

61. Efficiency and transparency are also hallmarks of the Public Finance Management Act 1 of 1999 and other procurement legislation and regulations.

62. However, this legislation alone does not prevent massive losses, maladministration and widespread corruption in procurement. As stated above, this is a failure of governance, not of legislation.

Ad paragraph 94 thereof

63. The content of this paragraph is denied.

64. Efficient systems and institution-building do not require the implementation of the NHI Act.

Ad paragraph 95 thereof

65. The content of this paragraph is denied.

66. The evidence detailed in the PriceMetrics reports shows that single-payer systems are the purview of wealthy nations alone. The point is augmented in Sakeliga's founding affidavit with my additional research. It is plainly evident that wealth and income levels, and economic growth and development conditions prevailing in countries that adopted single-payer systems were vastly higher and stronger than those prevailing in South Africa.

67. Nevertheless, the Minister does not properly grasp the issue. It is not one of who is entitled to such a luxury or not, but about feasibility, sustainability, and critical economic and social trade-offs.

Ad paragraph 96 thereof

68. The content of this paragraph is denied.

69. The Elders' Charter report attached as SRA1 to Dr Crisp's affidavit is an advocacy document produced by the Elders Foundation, a non-governmental organisation, in collaboration with the Yale Center for the Study of Globalisation.

70. The Elders' Charter report provides no support for the proposition that a single-payer system is the only or best way to achieve universal health care.

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Indeed, precept 2 is premised on the condition that pertinent governance is effectively put in place. In other words, fiscal control and anti-corruption governance measures must be put in place first, before embarking on a single-payer system.

71. South Africa has not done this, and the NHI Act also does not achieve this.

72. The report further ignores the empirical reality that numerous highly successful universal health care systems use multi-payer models.

73. Moreover, precept 5 states that:

> *"In practice, because of resource constraints no country can achieve UHC immediately but a path to achieve it progressively should be determined and pursued from the outset. Achievement of UHC, even if done progressively,* ***is dependent on creating the conditions for accomplishing dynamic economic growth*** *along with inclusive, equitable and sustainable development,* ***as well as effective rule of law.***
>
> (Own emphasis)

74. This indeed supports the statements made in the PriceMetrics reports and, thereby, Sakeliga's case in its constitutional challenge. The NHI Act is not a path to the progressive realisation of universal health care. According to the Minister, based on his own statements, it is to be the NHI Act above all else, and the economy and other socio-economic rights must be damned.

Ad paragraph 97 thereof

75. The content of this paragraph is denied.

76. Sakeliga gave the example of Tembisa hospital to illustrate that the monopsony savings rationale of the NHI Act is flawed, as state procurement inefficiencies negate theoretical savings. Sakeliga further asserted that South Africa lacks the high-quality governance and administrative capacities necessary to manage the system, given the SIU's finding regarding Tembisa Hospital as an illustration of the high levels of corruption and administrative inefficiencies in the state health sector.

77. The Minister's assertion that he has "*no control over the disbursement of funds allocated to the provinces*" is a testament to the lack of governance and administrative capacities and smacks of a lack of accountability on the part of the Minister. As shown below, this is not a failure of legislation but of governance.

78. While it is correct that the primary responsibility for ensuring the proper and efficient financial management of funds allocated to the provinces is placed with the provincial government, the national government plays an important oversight role and is both constitutionally and statutorily obliged to ensure that funds allocated for a specific purpose, such as health, are properly protected and that the national health policies are maintained by the provinces.

79. In this respect:

79.1. Health services is a functional area of concurrent national and provincial legislative competence;

79.2. The National Health Act has, as one of its objects, to regulate national health and provide uniformity in respect of health services across the nation to *inter alia* protect, respect, promote and fulfil the rights of the people of South Africa and, in particular, vulnerable groups such as women, children, older persons and persons with disabilities;

79.3. The National Health Act further charges the Minister with the duty to *inter alia*:

79.3.1. Endeavour to protect, promote, improve and maintain the health of the population;

79.3.2. Determine the policies and measures necessary to protect, promote, improve and maintain the health and well-being of the population; and

79.3.3. Ensure the provision of such essential health services, which must at least include primary health services, to the population of the Republic as may be prescribed after consultation with the National Health Council.

79.4. Finally, section 100 of the Constitution provides that when a province cannot or does not fulfil an executive obligation in terms of the Constitution or legislation, the national executive (which includes the Minister) may intervene by taking any appropriate steps to ensure fulfilment of that obligation, including:

79.4.1. Issuing a directive to the provincial executive, describing the extent of the failure to fulfil its obligations and stating any steps required to meet its obligations; and

79.4.2. Assuming responsibility for the relevant obligation in that province to the extent necessary to: (i) maintain essential national standards or meet established minimum standards for the rendering of a service; (ii) maintain national economic unity; (iii) maintain national security; or (iv) prevent that province from taking unreasonable action that is prejudicial to the interests of another province or to the country as a whole.

80. The above obligations ought to be understood within the context of section 217 of the Constitution and the Public Finance Management Act.

81. A prime example of the Minister's powers in this respect was when certain departments of the national executive intervened with the provincial executive of Limpopo in terms of section 100 of the Constitution and assumed

responsibility for relevant functions of the provincial executive of Limpopo Province, including *inter alia*:

81.1. The Minister of Health assumed responsibility for the provincial Department of Health and Social Development; and

81.2. The Minister of Finance assumed responsibility for the provincial Department of Finance.

82. A copy of the Government Notice No. 1088 issued by the President of the Republic of South Africa and published in the Government Gazette on 22 December 2011 in respect of such national intervention is attached, marked "**SLR5**".

83. The Minister's "*c'est la vie*" attitude to the widespread corruption at Tembisa Hospital undermines the provision of health services, for which he is responsible. Apart from clearly conceding Sakeliga's point in this respect, the Minister's statements show a lack of *bona fides* and undermine the Minister's statements that he requires the NHI Act to protect vulnerable groups or that he requires the implementation of the NHI Act to exercise fiscal control over the provincial departments of health. He has the power to do so now, but is not exercising that power, arguably because of an unwarranted fixation on the NHI Act.

Ad paragraph 98 thereof

84. The content of this paragraph is denied.

85. A bare denial in response to a mountain of evidence is an inadequate response in this respect and is not honestly made. The comparative statistical evidence put forward by PriceMetrics showing the shortage of doctors and nurses (amongst other health professionals) is based on publicly available data from *inter alia* the World Bank and the Health Professions Council of South Africa and is part of a rigorous cross-country study.

Ad paragraph 99 thereof

86. The content of this paragraph is denied.

87. The Minister misses the point in pursuit of his own narrative.

88. Sakeliga's case consistently points toward the general harm and loss of economic welfare. Sakeliga does not focus on sectional interests. However, the implementation of the NHI Act will do great harm to medical and health care businesses, which will, in turn, diminish the quality and quantity of health care supply.

89. The so-called "private sector participants" are the very doctors, nurses and health professionals whose support the government needs in order to

establish social solidarity. The HASA papers show a compelling survey of medical practitioners that points to a strong lack of support.

Ad paragraph 100 thereof

90. The content of this paragraph is denied.

91. Sakeliga relies on objective facts supported by publicly available data in the PriceMetrics reports, which support the irrationality of the NHI Act.

92. The analysis specifically addresses the lack of adequate per capita income, weak fiscal capacity, poor governance, insufficient resources, and lack of stakeholder support, and concludes that none of the conditions necessary for a successful single-payer system are present in South Africa.

93. Sakeliga further asserts that the Minister has failed to provide his own estimates to support his claim, resorting merely to ridicule of other estimates of the cost of a fully implemented NHI made by private sector institutions.

Ad paragraphs 101 to 103 thereof

94. The content of these paragraphs is denied.

95. The government has failed and is reluctant to disclose the financial and fiscal implications of every envisaged phase of the NHI Act's implementation,

particularly for the period for which the stay is sought, which shows a lack of openness, transparency, clarity, and feasibility analysis.

96. The unsubstantiated *ipse dixit* of Dr Crisp and the Minister is cold comfort when several independent and unrelated experts warn against the adverse effects of implementation of the NHI Act.

97. I point out that the Minister is not being frank in respect of the "available funding" or in the claim that there is no funding shortfall. The Minister appears to be obfuscating the reality of resource trade-offs by falling back on a superficial tautology, viz. that there will be no funding shortfall because the department will spend on the NHI precisely the amount which is made available to it by National Treasury. However, in needing to obtain more money for the Department of Health to implement and run the NHI than is currently available, National Treasury does indeed encounter a funding shortfall. The Minister's replying affidavit betrays this sleight of hand by relying heavily on the cancellation of tax credits to beneficiaries of medical aid schemes as a source of funding for the NHI Act.

98. Regardless, on or about 12 November 2025, this funding avenue was roundly rejected by the Minister of Finance who described it at a media briefing in respect of the medium-term budget as an "attack on the middle class". The medium-term budget presented by the Minister of Finance to Parliament also confirmed that there would not be any scrapping of such tax credits in the medium term. As proof hereof, I attach hereto an article by News24, which

reports the Minister of Finance's statements at the media briefing, marked "**SLR6**".

99. This underscores the inherent difficulty with the NHI Act foretold by *inter alia* Sakeliga, that funding of the NHI Act must therefore come from raising taxes, engaging in unsustainable borrowing, irresponsible money printing, and/or taking away funding currently directed toward the provision of other socio-economic rights.

100. Dr Crisp's affidavit and the Minister's confirmatory affidavit were filed after this statement by the Minister of Finance and the presentation of the medium-term budget to Parliament. Not only are their affidavits concerningly silent in this respect, but the affidavits continue to advance a narrative that is factually incorrect.

101. The Minister cannot kick this can down the road – which is exactly what a grant of the stay will allow the Minister to do. Sakeliga's analysis demonstrates that regardless of how carefully the government phases in the NHI, the required funding is unsustainable. The Minister of Finance has already acknowledged the reality of South Africa's constrained fiscal capacity and the "fiscal cliff". PriceMetrics' econometric modelling on behalf of Sakeliga, even when including a phased-in approach that accounts for phasing in costs and government expenditure increases, sufficiently demonstrates unsustainability.

Ad paragraph 105 thereof

102. The content of this paragraph is denied.

103. The inefficient, wasteful and inequitable health care system described by Dr Crisp is the self-same health care system for which he and the Minister are responsible for ensuring is efficient, provides health care within its available resources, and is equitable.

104. As demonstrated above, the Minister appears unwilling to ensure the provision of health care and appears to consider himself having no control over health finances, which is untrue.

105. The legislation will not improve state governance or make health care better or cheaper.

Ad paragraphs 106 to 108 thereof

106. The content of these paragraphs is denied.

107. Dr Crisp has neither the experience nor the qualifications to rubbish the economic data and conclusions provided by Sakeliga in the PriceMetrics Reports.

108. This is no more than the usual playbook of denying without engaging. As public officials, the Minister and Dr Crisp are obliged to conduct their work

transparently and with accountability, including being accountable to the court when faced with hard truths.

109. I reiterate that the economic modelling conducted by PriceMetrics is conservative and based on publicly available data. Sakeliga persists therewith.

Ad paragraph 109 thereof

110. The content of this paragraph is denied.

111. Jordan is a first-world, oil-rich country that meets the pre-conditions set out by PriceMetrics that are necessary for implementation of a single-payer system.

112. The study conducted by the authors of the article attached as SRA2 makes the following recommendations:

> • *Promote the growth of expenditure and investment within the healthcare industry.*
>
> • *Enact a comprehensive strategy that prioritizes both economic efficiency and the fair distribution of healthcare services.*
>
> • *By prioritizing the development of infrastructure that directly and significantly benefits various segments of society, we can observe tangible improvements in both the standard of living and economic growth.*

113. The authors of the article attached as SRA2 are quite clear that their recommendations apply to any country with similar socio-political arrangements as Jordan. For the reasons set out in the PriceMetrics reports, South Africa is not a country with similar socio-political arrangements to Jordan.

114. Further, as stated by Sakeliga, the government has failed to take the necessary other economic and governance measures to support a single-payer system.

Ad paragraph 110 thereof

115. The content of this paragraph is denied.

116. The Department of Health's plans and estimates have been roundly rejected by the National Treasury and leading economists in South Africa. This is demonstrated by the numerous reports rendered by the applicants in the constitutional challenges.

117. Global empirical evidence shows that single-payer systems demand far higher spending than the Department of Health's estimates. Also, once again, to the extent that the Department of Health estimates 8.5% of GDP is to be spent on universal health care coverage, health care will necessarily be of exceedingly inferior quality, given South Africa's low per capita GDP. This is a point that was specifically made in PriceMetrics' cross-country analysis.

118. I point out further that 8.5% of South Africa's present GDP amounts to some R650 billion. The current national government budget is around R2 trillion. So, by the Minister's own estimates, state health care spending would rise from 12% of the budget (at present) to a massive 33% of the national budget.

119. Even by this conservative estimate, the NHI would constitute an enormous, unprecedented demand on public resources from a single expenditure item, at the expense of the provision of other socio-economic rights.

Ad paragraphs 111 to 112 thereof

120. The content of these paragraphs is denied.

121. The arguments made by the Minister are unsubstantiated and refuted by the empirical evidence presented in the PriceMetrics reports.

Ad paragraph 113 thereof

122. The content of this paragraph is denied.

123. There is nothing prohibiting the court from granting a just and equitable remedy should the court be inclined to grant a stay.

Ad paragraphs 114 to 118 thereof

124. The content of these paragraphs is denied.

125. Our courts do not speculate in respect of mootness, and possible mootness is not a reason to grant a stay.

126. Nevertheless:

126.1. The Minister cannot deny that the financial resources involved in such litigation pale in comparison to the financial and human resources that will be wasted implementing the NHI Act should the NHI Act ultimately be set aside; and

126.2. The Minister cannot deny that a stay will prevent the constitutional challenges from obtaining effective relief in due course if a stay is granted and the state is permitted to proceed with implementation of the NHI Act.

Ad paragraphs 120 to 127 thereof

127. I persist with the facts set out in the answering affidavit of Sakeliga read with this affidavit. I deny the content hereof insofar as it does not accord with the aforesaid facts.

128. I reiterate that Dr Crisp, the Minister and the Department of Health have neither the necessary qualifications nor experience in macroeconomic analysis to express expert opinions on the effect of NHI on the South African economy. Health economics expertise at the microeconomic level – such as clinical cost-effectiveness or hospital-level resource allocation – does not

equip one to conduct or critique macroeconomic analysis of national fiscal sustainability, GDP impacts, tax capacity, or broader economic consequences of system-wide healthcare financing reform. These are matters requiring specialised expertise in macroeconomics and econometric modelling, which are properly addressed in the PriceMetrics reports. Dr Crisp's attempted rebuttal of macroeconomic evidence falls outside his area of competence.

129. My qualifications and experience are aligned with issues of macroeconomics and are properly set out in Sakeliga's affidavit in its constitutional challenge.

Ad paragraphs 128 to 132 thereof

130. The content of these paragraphs is denied.

131. I have dealt with these issues in Sakeliga's answering affidavit.

132. The Minister cannot deny that the financial resources involved in such litigation pale in comparison to the financial and human resources that will be wasted implementing the NHI Act should the NHI Act ultimately be set aside. This denial is dishonest.

Ad paragraphs 133 to 135 thereof

133. The content of these paragraphs is denied.

134. Canada is a first-world, high-income country with a high per capita GDP. Comparing Canada's health care spending with South Africa is a false equivalence.

135. The NHI Act is fiscally unaffordable. The cost of implementation is such that the state would have to shift funds from other programmes as described in paragraph 101.3 of the Sakeliga answer, unless other highly damaging and unsustainable methods of fundraising are used, such as much greater taxation, borrowing, or money-printing. I persist with the facts set out in paragraph 101 of the Sakeliga answering affidavit and the subparagraphs thereto.

Ad paragraphs 136 to 137 thereof

136. The content of these paragraphs is denied.

137. Sakeliga has presented sufficient expert economic evidence to show that its challenge has reasonable prospects of success. The Minister has not attempted to discharge its evidentiary burden.

Ad paragraphs 145 to 148 thereof

138. The content of these paragraphs is denied.

139. The Minister fails to disclose even an estimated cost of establishing the statutory bodies, committees and administrative structures contemplated in

the NHI Act. The Minister cannot approbate in respect of litigation costs and reprobate in respect of the costs of implementation.

140. As stated above, the existing law requires the Minister to prioritise the interests of vulnerable groups in South Africa.

Ad paragraphs 151 to 156 thereof

141. Save to admit that improvements need to be made to the state health sector, the content of these paragraphs is denied.

142. I point out, again, that qualitative improvements are matters of governance, not legislation.

143. I deny that Sakeliga or PriceMetrics have misrepresented what is reported by the Auditor-General of South Africa.

144. The Minister assumes that the NHI Act itself will prevent corruption, waste and abuse. This is nonsensical. It is no more than an attempt to dismiss the comprehensive analysis provided by Sakeliga and PriceMetrics through bald allegations and deflections.

145. It is not Sakeliga's role to defend the private medical schemes against allegations of having been defrauded by their clientele. Also, the alleged fraud in medical schemes does not defraud taxpayers. Members of private medical schemes are at liberty to pressure their schemes to improve fraud-prevention

or move to competitive alternatives, either individually or collectively. The NHI Act locks people in without an alternative and with far weaker, slower, and more diffuse mechanisms of pressure and accountability for rectification. Moreover, if fraud occurs even in the competitive private sector where schemes have strong incentives to prevent losses, fraudulent claims from the NHI Fund can be expected to be substantially higher in an uncompetitive, state-run bureaucracy with weaker accountability mechanisms and no competitive pressure to minimise losses.

Ad paragraphs 157 to 158 thereof

146. The content of these paragraphs is denied.

Ad paragraphs 163 to 164 thereof

147. The content of these paragraphs is denied.

148. Notwithstanding that the Minister's statements lack context as to whether spending R11 billion on over 8,000 maintenance and construction projects (an average of R1.4 million per project) is a lot or a little, they support Sakeliga's view because the poor state of public facilities shows there is little to no tangible return on investment. What money is spent, is spent poorly, inefficiently and at times corruptly (e.g. Tembisa Hospital).

149. The Minister fails to appreciate that throwing money at a particular problem rarely (if ever) solves it. The money must be spent efficiently and with

accountability to ensure return on investment. Spending money without sufficient reforms in governance quality, accountability, mechanisms for allocative accuracy and efficiency, and other institutional imperatives will lead to squandered resources.

150. Blaming (even obliquely) other government departments is not an adequate response without stating what steps the Minister has taken to ensure the provision of efficient health services in accordance with the principles of co-operative governance.

151. The same transfer of blame and lack of accountability is apparent in respect of the Tembisa fraud losses. I attach hereto, marked "**SLR7**", an article published by IOL which reports that the Minister had called upon the Special Investigating Unit to blacklist the 207 service providers involved in the R2 billion scandal. The article proceeds to state that, in an answer to a written Parliamentary question, the Minister stated that the responsibility for blacklisting service providers ultimately lay with National Treasury.

Ad paragraph 165 thereof

152. The content of this paragraph is denied.

153. The corruption at Tembisa Hospital was not novel. It was first discovered by Babita Deokaran based on a straightforward review of the department's accounts and the hyper-inflated procurement contracts.

Ad paragraph 166 thereof

154. The content of this paragraph is denied.

155. It is not that fraud is not detected, but that those who detect fraud do not speak up for fear of their lives. The government has fostered a culture of non-accountability.

Ad paragraph 167 thereof

156. The content of this paragraph is denied.

157. The simple truth is that the Minister's unwarranted fixation on the NHI Act overshadows his ability to improve the governance of the state health sector in accordance with his current statutory powers.

Ad paragraphs 168 to 172 thereof

158. The content of these paragraphs is denied.

159. The Minister concedes that members of LCBO will be allowed to see general practitioners, i.e. they will have the freedom to choose a GP and will thereby get better care than when at the mercy of the state health system.

160. The Minister is correct that this matter is not about LCBO's. The simple point is that there are a plethora of fast legislative or regulatory options for efficiently

expanding quality health care coverage that can be pursued that do not cost the state anything. Yet, such measures are not being pursued because of a fixation on the NHI Act as a silver bullet.

Ad paragraph 177 thereof

161. The content of this paragraph is denied.

Ad paragraphs 184 to 189 thereof

162. The content of these paragraphs is denied.

163. There are no "fixed timelines" that are currently in effect, as the NHI Act is not yet in effect.

164. It is not possible to breach an Act that is not in effect and does not have the force of law.

165. I persist with the facts set out in the answering affidavit of Sakeliga.

Ad paragraphs 190 to 191 thereof

166. The content of these paragraphs is denied.

167. Legal argument in this regard will be advanced at the hearing of this application.

(b) <u>The President's answering affidavit (commencing at p 002-150)</u>

<u>Ad paragraph 9 thereof</u>

168. It was not possible for Sakeliga to foreshadow at the case management meeting held on 16 September 2025 that it would file a conditional counter-application.

169. I am informed by Sakeliga's legal representatives that, at the time of the aforesaid case management meeting, Sakeliga had not yet received the stay application and was not aware of the basis on which the stay was sought. It goes without saying that Sakeliga was thus entirely unable to consider its position in respect of the stay application and could not, at that time, foresee that it would institute the conditional counter-application.

170. Sakeliga and its legal representatives were only provided with access to the stay application on CaseLines after the case management meeting.

171. A confirmatory affidavit filed by Sakeliga's attorneys of record confirming the above will be filed together with this affidavit.

172. Notwithstanding the above, a complete set of affidavits will have been filed in respect of the conditional counter-application. This has not delayed the proceedings or caused any of the parties any prejudice.

Ad "THE PRESIDENT'S GOOD FAITH"

Ad paragraphs 14 to 21 thereof

173. The Minister and the President's conduct evinces a clear intent to engage in piecemeal litigation, which, Sakeliga is advised, our courts have consistently warned against and which is not permitted by the uniform rules of court.

174. Any other litigant in the shoes of the Minister and the President is required to have filed an answering affidavit in which it raises any preliminary issues it intends to raise and thereafter proceed to "plead over" and answer the substantive allegations. The Minister and President's strategy is to avoid pleading over.

Ad paragraphs 22 to 25 thereof

175. Save to admit that the President is cited in Sakeliga's constitutional challenge, the content of these paragraphs is denied.

176. There is no separate interest between the President and the Minister. The Minister is cited in a nominal capacity in accordance with section 2 of the State Liability Act 20 of 1957, and the President is cited as the head of the national executive.

177. The arguments here overlook the principle of cabinet consensus. Even if, conceivably, both the Minister and the President espouse unique views, the

stay application is premised on wasted costs. A concern for wasted legal costs would also have informed a singular, rather than separate, answer from the state parties.

178. In this respect, I ask rhetorically why the President does not participate in all constitutional challenges?

Ad paragraph 27 thereof

179. The content of this paragraph is denied.

180. The President stops short of identifying exactly what sections of the NHI Act he intends not to introduce so as not to conflict with the Minister's undertaking.

181. Sakeliga submits that it is only logical that none of the sections of the NHI Act ought to be introduced so as not to undermine the Minister's undertaking.

Ad paragraph 29 thereof

182. The content of this paragraph is denied.

183. Seeking case management in a matter of this magnitude, involving as many parties as it does, is not good faith but a necessity.

Ad paragraph 30 thereof

184. The content of this paragraph is denied.

185. The NHI Act was signed on 15 May 2024, not in 2023.

186. Sakeliga has not framed its case as urgent. It merely seeks a fair chance to have its case heard and adjudicated.

Ad "SAKELIGA'S CONDITIONAL COUNTER-APPLICATION"

Ad paragraphs 35 to 40 thereof

187. The content of these paragraphs is denied.

188. The basis on which the relief in the conditional counter-application is sought is clearly and adequately set out in Sakeliga's answering affidavit.

Ad paragraphs 41 to 43 thereof

189. The content of these paragraphs is denied.

190. The basis on which the relief in the conditional counter-application is sought is clearly and adequately set out in Sakeliga's answering affidavit.

191. The relief in the conditional counter-application is only sought in the event that the court is inclined to grant a stay. This is a clear case where the *status quo* ought to be preserved. It is not an abuse.

192. Nevertheless, the Minister and the President's opposition to the counter-application is not consistent with the Minister and the President's stated

grounds for seeking a stay of proceedings, namely, to be economical with state resources.

Ad paragraphs 44 to 46 thereof

193. The content of these paragraphs is denied.

194. The counter-application is brought in answer to the Minister's stay application and only arises if the court is inclined to grant a stay. Sakeliga has acted in accordance with its legal rights.

Ad paragraphs 47 to 48 thereof

195. The content of these paragraphs is denied.

196. The President has no obligations under section 59 of the NHI Act, as the NHI Act is not yet in effect. There is no risk of interfering with the President's constitutional and statutory obligations.

197. The relief sought in the conditional counter-application accords with the President's stated intention of activating the NHI Act in accordance with judicial and legislative integrity.

198. Sakeliga does not seek that its challenge must proceed in isolation.

199. Nevertheless:

199.1. The President cannot deny that the financial resources involved in such litigation pale in comparison to the financial and human resources that will be wasted implementing the NHI Act should the NHI Act ultimately be set aside; and

199.2. The President cannot deny that a stay will prevent the constitutional challenges from obtaining effective relief in due course if a stay is granted and the state is permitted to proceed with implementation of the NHI Act.

Ad paragraph 49 thereof

200. Sakeliga does not object to the late filing of the President's affidavit.

201. To the extent necessary, Sakeliga seeks condonation for the late filing of this affidavit.

B. CONCLUSION

202. In the circumstances, neither the Minister nor the President have provided any reason why, should the court be inclined to grant a stay of proceedings, the implementation of the NHI Act ought not be stalled for the duration of the stay.

203. Not only is this a just and equitable outcome which ensures that the applicants

in the constitutional challenges are ensured substantive relief in due course, it wholly accords with the Minister's reasons for seeking a stay in the first place:

203.1. It will preserve the state's financial and human resources; and

203.2. It promotes comity not only between the courts but between the various spheres of government. It is no more than a necessary step in a constitutional system where the power of all spheres of government is subject to the supremacy of the Constitution.

204. Sakeliga persists in its opposition to the stay and, should the court nevertheless incline to grant a stay, Sakeliga persists in the counter-application.

DEPONENT

I certify that the deponent has acknowledged that he knows and understands the content of this affidavit which was signed and sworn to, before me, at CLAREMONT on this 17TH day of DECEMBER 2025, the Regulations contained in Government Notice No. R. 1258 dated 21 July 1972 (as amended) and Government Notice No. R.4648 dated 19 August 1977 (as amended) having been complied with.

COMMISSIONER OF OATHS

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A Public Health Approach to Suicide Prevention 3

The effect of economic downturn, financial hardship, unemployment, and relevant government responses on suicide

Mark Sinyor, Morton Silverman, Jane Pirkis, Keith Hawton

Economic circumstances and related factors, including unemployment and poverty, can have substantial effects on suicide rates. This relationship applies in all countries, irrespective of their World Bank income status or level of development. Therefore, means of mitigating such influences are essential components of strategies to reduce suicides. In this Series paper, we consider examples of such initiatives, including national policies to try to reduce the effect of economic downturns, efforts to maintain employment and avoid damaging austerity measures, maintenance of reasonable minimum wage levels, and specific policies to assist those most affected by poverty. We also highlight upstream measures such as investment in transport infrastructure, industries, and retraining programmes. Positive public health messaging that encourages coping, together with discouragement of media stories with messages that could contribute to hopelessness in those experiencing economic difficulties, can also be important components of strategies to try to reduce the effect of economic downturn on suicide.

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This is the third in a Series of six papers on a public health approach to suicide. All papers in the Series are available at www.thelancet.com/series/suicide-prevention

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Introduction

Economic and employment circumstances can have major effects on the mental health and suicide risk of populations and individuals. Indeed, substantial downturns in these factors are key contributors to changes in population suicide rates. In this Series paper, we consider the evidence for this and examine various ways of tackling the adverse influence of financial hardship and unemployment on suicide. This Series paper expands on some of the concepts introduced in the first paper in this Series, viewing these key socioeconomic influences, and the policies and systems that confer risk for them or protect against them, as crucial social determinants of suicide. This Series paper promotes a public health approach that requires strong commitment from a range of government sectors, many of which fall outside of health.

Financial hardship, unemployment, and suicide

The relationship between socioeconomic conditions and suicide is complex. Suicide rates are often higher in groups that experience economic disadvantage, including financial hardship and unemployment. The integrated motivational–volitional model[1] of suicidal behaviour identifies defeat and humiliation, entrapment, lack of belongingness, and perceived burdensomeness as key precursors to suicidal thinking; some or all of these psychological processes might be at play for those who are economically disadvantaged. A 2022 review of studies showed that increased general measures of economic hardship (eg, economic recession and unemployment) and, specifically, changes in aggregate consumption (ie, the amount of consumer spending in relation to disposable income across an economy) were associated with increased suicide rates.[2]

A meta-analysis published in 2023 examining studies predominantly conducted in high-income countries (HICs) concluded that individuals in the general population experiencing financial stress were 74% more likely to die by suicide (23 studies) and unemployed individuals were 87% more likely to do so (43 studies), although associated mental and physical health factors could have contributed to this excess risk.[3] Of note, the relative risk of suicide among people experiencing financial stress was similar across countries with low and high per capita gross domestic product (GDP; low: 1·75; high: 1·78).[3] A 2016 systematic review examining the relationship between measures of poverty and suicides in low-income and middle-income countries (LMICs) indicated that there were frequent positive associations between the two, although these were not uniformly observed.[4] There were similar findings from studies of non-fatal suicidal behaviour.[4] In short, unemployment and poverty appear to have substantial effects, increasing suicide rates across HICs and LMICs worldwide.

In the USA, economists have proposed that so-called cumulative disadvantage—whereby consecutive birth cohorts experience conditions that result in worsening labour market opportunities—plays a major role in mortality, including suicide, particularly in White people with low levels of education.[5] Income inequality, the degree to which income is unevenly distributed across a population, might also have a role. Analysis of data from 431 637 adults aged 30–74 years and 375 354 adults aged 20–44 years from the US National Longitudinal Mortality Study (1979–87) indicated that every 0·1 increase in the Gini coefficient (a common measure of income inequality that ranges from 0 to 1) was associated with a modest 0·2% increase in suicide rates.[6]

Evidence predominantly from HICs indicates that unemployment rates are often associated with suicide. This relationship might be particularly true for males; in an analysis of data from 30 countries between 1960 and 2012, associations appeared the strongest in eastern and southern Europe, which were the two country groups with the weakest unemployment protections.[7] However, a US study found that the association between unemployment and suicide was stronger in states that have more women in the workforce.[8] Mass layoff events, in which large groups of individuals are suddenly unemployed, are likewise associated with excess suicides; US data suggest that there is one additional suicide for every 4200 males and 7100 females who become unemployed as a result of a mass layoff.[9]

Evidence also indicates an association between poor economic status and suicide in LMICs. In a systematic review, Iemmi and colleagues found an association existed between poverty and suicide.[4] Unemployment could likewise be a key driver of suicide in LMICs. For example, in India, higher suicide rates in males are observed in states with higher levels of unemployment.[10] Unemployment also appears to be one of the most important risk factors for suicide in Indian females.[11] The suicide rate among unemployed females in India was found to be 94·8 per 100 000 people, compared with 12·6 per 100 000 people for professional or salaried employees, 11·6 per 100 000 people for those who were self-employed, and 4·3 per 100 000 for students. In a 2015 review investigating the association between lower socioeconomic circumstances and suicidal behaviour in LMICs, most studies showed that lower levels of socioeconomic position were associated with an increased risk of suicide attempts or deaths.[12] In India, a model accounting for the proportion of farmers with marginal land holdings, indebted farmers, and the proportion of land used for non-food crops (so-called cash crops), explained 75% of the variation in suicide rates between states.[13] In summary, a confluence of evidence indicates that both financial hardship and unemployment are major contributing factors to suicide rates globally.

Economic downturns and suicide

Suicide rates often rise during periods of economic downturn such as recessions. During the Great Depression of the late 1920s and early 1930s, rates of suicide in males in the UK rose in parallel with increases in unemployment, with a less marked but nonetheless considerable rise in female suicide rates.[14] The severe Asian economic crisis that began in 1998 was accompanied by a substantial increase in suicide rates in several Asian countries. One study estimated that there were an additional 10 400 suicides in 1998 (compared with 1997) in Japan, Hong Kong, and South Korea, where the economic crisis severely affected GDP and unemployment rates. Evidence suggests that the effect of the economic crisis on suicide rates was greater in men than in women.[15] No such increases were identified in Taiwan and Singapore, where the economic crisis had a much smaller effect.

A study in 54 countries of the effect of the 2008 global economic crisis showed that it was associated with an estimated 4884 excess suicides, most of them occurring in men in American (6·4% increase) and European (4·2% increase) countries, with smaller magnitude increases observed for women in American countries (2·3%) and no increases for women in European countries.[16,17] Excess suicides were more likely to be observed in countries with higher unemployment, especially when unemployment rates before the crisis had been low.[17] One US study examining trends in suicide rates associated with the recession against those predicted by trends before the recession showed no increase in suicides was detected, except in men aged 65 years and above and women aged 15–24 years.[18]

Between 2008 and 2010, rates of hospital presentations for non-fatal self-harm in England increased in both genders, with a clear association with local rises in levels of unemployment.[19] Those who self-harmed during this period were also more likely to report work-related, financial, and housing problems.[19] Likewise, there was evidence of a similar recession-related increase in suicide attempts in Spain.[20]

There is some evidence that recession-related suicides might be more likely to occur in employed people with financial difficulties, dependents, and those without a history of self-harm or psychiatric care,[21] suggesting that economic downturn could result in more suicides in those who might normally be at lower risk.

Fiscal and monetary policies and suicide

Fiscal policies, implemented by governments in the form of spending and taxation to influence economies, can have an effect on suicide rates. Austerity measures implemented by governments are often associated with increases in suicides, in both the short and longer terms.[2,22,23] Recessions themselves and the austerity measures that are sometimes enacted in response to them can work synergistically and be associated with increased suicide rates.[24] Monetary policies can also have a role. When central banks institute contractionary measures to reduce inflation, this can result in lower aggregate demand and increased unemployment rates[25] that could in turn increase the risk of suicide.

Socioeconomic measures that could prevent suicide

Several strategies aimed at reducing financial strain and improving socioeconomic conditions can have major beneficial effects on suicide rates.[26] A study using data from 175 countries between 1991 and 2017 showed that for every 1% increase in unemployment, there was a 2–3% increase in suicide rates in those aged 30–59 years,[27] suggesting that if such an increase in unemployment

could be prevented then so would the corresponding increase in suicides. The study also showed that for every $1000 increase in per capita GDP there was an associated 2% reduction in suicide rates,[27] which would equate to 14000–15000 fewer suicide deaths per year globally.

In the USA, social welfare spending, including state-directed welfare spending and publicly funded medical coverage for individuals and families with low incomes, was associated with lower suicide rates at the state level, even after adjustment for potential confounding factors.[26] Similarly, a study of 26 European countries showed that social welfare expenditures were associated with fewer suicides in both males and females in most countries.[28] Spending on active labour market programmes and employment protection legislation have also both been associated with lower suicide rates.[2] Countries in Europe that invested heavily in labour market programmes in times of economic downturn found that investment attenuated the effect of unemployment on suicide, with every $10 greater investment per capita being associated with a 0·04% reduced effect of unemployment on suicide.[29] In general, adverse effects of economic downturn on suicide appeared to be negated when investment in labour market programmes was high.[29,30]

Similar findings have been observed for interventions that raise incomes of low-wage workers, particularly when wage increases exceed the rate of inflation,[26,31,32] although attaining such an outcome can be challenging politically.[26] A US study of monthly suicide rates from 1990 to 2015 found that a $1 increase in the minimum wage was associated with a 3·4–5·9% reduction in suicide rates in adults aged 18–64 years with a high school education or less.[32] Kaufman and colleagues estimated that if the minimum wage had been increased by the 2015 equivalent of $1, 13800 of the suicides that occurred between 2009 and 2015 could have been prevented within this group; if it had increased by $2, an estimated 25900 suicides in this group could have been prevented.[32] In a related study, a $1 increase in the US minimum wage was associated with an average 1·9% reduction in the annual state suicide rates, equivalent to 8000 fewer deaths by suicide during the study period.[31] Another analysis, which likewise found a 10% minimum wage increase reduced non-drug suicides in low-educated adults by 2·7%, modelled a similar benefit for the earned income tax credit (EITC).[33] The EITC, which lowers the tax burden on those with low to moderate incomes, was associated with fewer suicides in both males and females, with modelling indicating a 3% overall decrease in suicide rates for every 10% increase in the maximum EITC credit.[33] The authors estimated that both policies combined could prevent more than 700 suicides per year.[33] Although such statistically modelled analyses clearly have limitations, they nonetheless help identify the potential effects of positive economic policies on suicide.

Conditional cash transfers are a novel intervention for suicide prevention introduced in Brazil in 2004. The cash transfers involve an income supplement guarantee to families below particular income thresholds to immediately relieve poverty, aiming to incentivise and increase access to public services including education, health care, and job skills training. In an analysis of 36742 suicides in a population of 76532158 individuals aged 10 years or older, beneficiaries of cash transfers were 56% less likely to die by suicide over a 12-year period compared with non-beneficiaries. The association was particularly strong in women (64% lower) and in people aged 25–59 years (59% lower).[34]

Increases in local government spending might also help counter austerity measures and reduce suicides. In Japan, based on data from 2001 to 2014, areas with a 1% increase in per capita local government spending had a 0·2% reduction in suicide rates in adults aged 40–64 years.[35] These findings collectively show the importance of both fiscal and monetary policies that promote economic growth as key strategies for suicide prevention.

In addition to strategic spending initiatives aimed at suicide prevention, governments should consider the potential role of upstream policies. It is a reasonable speculation that many efforts to improve public well-being more generally, together with national productivity, could result in incremental reductions in suicide rates. Such efforts could include, for example, investment in infrastructure (eg, bridges, roads), strategic support for specific industries (eg, transportation, green industries, technology), and retraining and educational programmes to equip unemployed people with the skills to meet changing industrial needs. At a more fundamental level, investment to keep young people in school to advance their education and better prepare them for the workforce could be a helpful intervention as both truancy[36] and homelessness[37] in young people increase their risk of suicide. Raising the level of educational attainment for the population can also lead to lower unemployment rates. Another relevant innovative policy approach is the so-called wellbeing budget, aimed at investing in quality of life and upstream determinants of health.[38] Policies relevant to health and social care provision include signposting and training for front-line staff and volunteers in contact with people likely to be affected by economic downturns or adversity, assistance to help such individuals navigate support systems, and encouragement of sympathetic debt recovery. Wellbeing budgets can also be mechanisms for tackling negative socioeconomic conditions directly, as is the case in New Zealand, where one of the five wellbeing budget priorities includes reducing child poverty.[38]

Another important aspect of prevention, especially at times of economic setback, is public messaging. For example, the media should avoid producing stories that encourage expectation that people experiencing poverty,

unemployment, or strain, especially at times of economic downturn, might die by suicide; instead, there should be more messages modelling survival under such circumstances and encouraging help seeking[39] (as discussed in the fourth paper in this Series[40]). The efforts described here should be conceived of and, where applicable, undertaken proactively over time rather than only being introduced reactively during a financial downturn.

Conclusion

There is clear evidence that socioeconomic conditions, both personal financial difficulties and national economic downturn, are key determinants of suicide. In some cases, these conditions might act synergistically to confer risk across a population, for example in the case of an economic downturn occurring simultaneously with a cost-of-living crisis. Although tackling socioeconomic influences presents major challenges, there is also evidence that coordinated policies can be effective. Development and implementation of these policies requires strategic cross-sectoral thinking and action that not only involves ministries of health but also ministries with responsibility for areas such as finance, labour, education, and welfare. Policy makers and staff in all sectors should be supported to understand how their policies could affect suicide rates.[41,42]

Aiming for countries and regions to lower rates of unemployment and poverty, increase their GDP, and avoid economic downturns might seem a challenging task as governments and financial systems already pursue these notoriously difficult outcomes. Nevertheless, strategic approaches involving decision making that could result in even marginal shifts in these population-wide parameters are likely to make a meaningful difference to suicide prevention efforts. Strategic spending can include preserving and protecting funding for active labour market programmes and debt relief programmes, as well as investment in programmes that support parents and families, and mental health programmes.[31] These policies might always be useful but will be especially important during economic downturns. Such public health efforts would be enhanced by targeted service-level initiatives, such as financial protection measures for people with mental health problems who are in debt. A more holistic and upstream view of suicide prevention could include attention to innovative strategies, such as the cash transfers piloted in Brazil and wellbeing budgets, together with policies that enhance support for large-scale industries and increase educational and retraining opportunities likely to improve the population's capacity to contribute to national economic output. To be successful, the design of such strategies must consider the unique economic and cultural context of each country and region.

A key goal going forward must also be to generate higher quality data and evidence, particularly in LMIC settings which account for three-quarters of all global suicides[43] but only about one-quarter of all published studies in this area.[44] These endeavours will necessarily involve comparing, contrasting, and combining data from different countries to generate a more complete picture of how different economic factors contribute to suicide. Future efforts to address society-wide socioeconomic conditions should likewise be paired with research to determine whether they achieve the hypothesised reductions in suicide rates and related outcomes.

Contributors

MSin, KH, and JP took joint responsibility for conceptualising the content of the article. MSin and KH took lead responsibility for preparing the first draft of the manuscript. MSil contributed to subsequent drafts. MSin, KH, and JP then further reviewed and edited the manuscript.

Declaration of interests

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Economic activity and suicides: Causal evidence from macroeconomic shocks in England and Wales

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ABSTRACT

The relationship between economic activity and suicides has been the subject of much scrutiny, but the focus in the extant literature has been almost exclusively on estimating *associations* rather than *causal* effects. In this paper, using data from England and Wales between January 1, 1997 and December 31, 2017, we propose a plausible set of assumptions to estimate the *causal* impacts of well-known macroeconomic variables on the daily suicide rate. Our identification strategy relies on scheduled macroeconomic announcements and professional economic forecasts. An important advantage of using these variables to model suicide rates is that they can efficiently capture the elements of 'surprise or shock' via the observed difference between how the economy *actually* performed and how it was *expected* to perform. Provided that professional forecasts are unbiased and efficient, the estimated 'surprises or shocks' are 'as good as random', and therefore are exogenous. We employ time series regressions and present robust evidence that these exogenous macroeconomic shocks affect the suicide rate. Overall, our results are consistent with economic theory that shocks that reduce estimated permanent income, and therefore expected lifetime utility, can propel suicide rates. Specifically, at the population level, negative shocks to consumer confidence and house prices accelerate the suicide rate. However, there is evidence of behavioural heterogeneity between sexes, states of the economy, and levels of public trust in government. Negative shocks to the retail price index (RPI) raise the suicide rate for males. Negative shocks to the growth rate in gross domestic product (GDP) raise the population suicide rate when the economy is doing poorly. When public trust in government is low, increases in the unemployment rate increase the suicide rate for females.

1. Introduction

Suicide is a preventable global public health issue that claims 703,000 lives per year (WHO, 2021). Suicide is currently the fourth leading cause of death globally for adolescents and adults aged 15–29 and affects twice as many men than women. In England and Wales, in 2021, suicide was reportedly highest amongst working aged people between 45 and 54 (more severe for men than women. See Fig. 1). In a recent report, Baker (2022) finds that the suicide rate in the most deprived 10% of areas during 2017–2019 in England was 14.1 per 100, 000, which is almost double the rate of 7.4 in the least deprived decile. These facts, as well as prevailing discussions in the academic and policy circles (Berk et al., 2006; Claveria, 2022) on the causes and preventive measures of suicide, suggest that economic conditions can act as 'climate factors' to precipitate the risk of suicide. However, the substantive literature on the subject (which we will discuss shortly) appears to establish an *association*, rather than establishing a robust *causal* link, between economic activities and suicide, challenged primarily by finding the right source of exogenous variations of the causal instrument. In this paper, we propose a mechanism that helps identify an exogenous source of variations via macroeconomic announcements and professional forecasts. We use them to establish the *causal* effects of economic activities on suicide under a plausible set of assumptions.

Suicide is a complex outcome of the interaction among 'seed' factors, such as mental illness, 'soil' factors, such as the influence of major life events, and 'climate' factors, which include changes in economic conditions (Berk et al., 2006). However, it is often challenging to disentangle 'seed' from 'climate' factors, as mental instabilities can result

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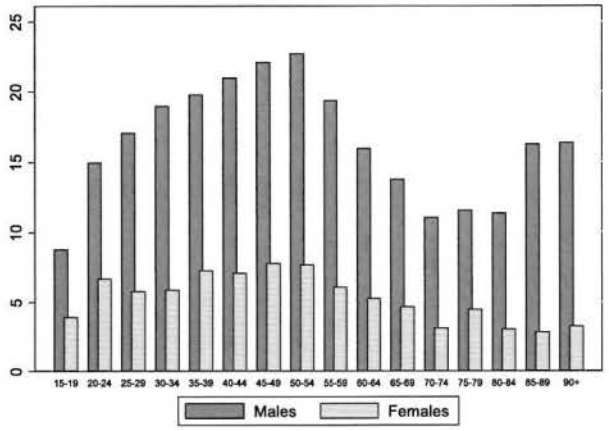


Fig. 1. Suicide rate per 100,000 in 2021 by sex and age group, England and Wales.
Source: ONS, Suicides in England and Wales tables, Table 5.

from regressive economic conditions, where deprived sections of a society would derive negative expectations of their future income stream. Among economic factors that are *associated with* the decision to commit suicide are unemployment (Morrell et al., 1993), economic recessions (Oyesanya et al., 2015), GDP growth (Agrrawal et al., 2017), inflation (Fountoulakis et al., 2014), consumer sentiment (Botha and Nguyen, 2022), economic policy uncertainty (Vandoros et al., 2019), and financial market fluctuations (Wisniewski et al., 2020). The methodological challenges of eliciting a reliable source of exogenous variations in these factors, which we will discuss in detail in Section 2.4, appear still significant in the extant studies.

Indeed, economic recessions and mediators such as unemployment, income decline, and unmanageable debts (captured broadly, for instance, via an aggregate index such as the global economic uncertainty index, as in Claveria (2022)) are significantly associated with poor mental well-being, increased rates of common mental disorders, substance-related disorders, and suicidal behaviours (Frasquilho et al., 2015; Martin-Carrasco et al., 2016). Based on data from Emergency Departments, recent unemployment is associated with increased risk of inflicting injury to partners (Kyriacou et al., 1999) whilst, during the mortgage market crisis, the number of domestic violence related hospitalisations increased (Medel-Herrero et al., 2020). This may be related to the level of acute stress experienced by the perpetrator (Bhalotra et al., 2021), which is also known to increase immediate voluntary alcohol consumption (De Goeij et al., 2015). Evidence from experimental studies confirms the relationship between economic crises, poor mental health and the risk of suicide. For example, a recent study by Christian et al. (2019) documented the effect of economic shocks, due to lack of rainfall on crop production, on mental health and the rate of suicides in Indonesia.

Many suicides happen impulsively during times of crisis (Rimkeviciene et al., 2015). They may progress from ideation to execution in a manner of hours or even minutes (Simon et al., 2001). While statistics on the proportion of such impulsive attempts vary wildly, some authors put it as high as 50% (Caceda et al., 2018) or even 80% (Kleespies et al., 2011). While the roles played by some calendar patterns, e.g. days of the week, holidays (Beauchamp et al., 2014), and environmental phenomena, e.g. temperature, air pollution (Heo et al., 2021; Page et al., 2007), have been studied, little is known about the short-term economic factors that may precipitate a decision to commit suicide. Public education and medical treatments should be focused on raising awareness and access to support amongst populations at higher risk. To better understand at risk groups, it is imperative that we examine the short-term economic factors that may trigger an ongoing decision to take one's own life or elicit an impulsive suicide attempt.

Furthermore, to the best of our knowledge, the question of *causality* has remained largely under-researched in this area, where current evidence is usually derived from time series or panel data analyses that estimate the *association* between the suicide rate (or suicide counts) and the economic factor(s) of interest. The limitation of previous studies is that, due to simultaneity and omitted variable biases, simply regressing the suicide rate on some economic factor(s) and a set of controls cannot produce unbiased and consistent estimates on the *causal* effects of the economic factors under observation. In this paper, we aim to estimate the *causal* relationships between six well-known macroeconomic indicators (GDP growth, retail sales, consumer confidence, house prices, unemployment rate, and the RPI) and suicidal behaviour under a plausible set of assumptions. (These indicators are defined in Panel B of Table 1.) By examining the impact of daily macroeconomic shocks, we can shed light on which economic factors may influence an individual's decision to commit suicide on a given day, thereby informing policies and programmes for suicide prevention.

2. Methods

2.1. Suicides data

We obtain a daily time series of the number of suicides in England and Wales from the Office for National Statistics (ONS). Since our data about macroeconomic shocks start from the beginning of January 1997 and the suicides data are available until the end of 2017, the sample period employed in the empirical analysis is from January 1, 1997 to December 31, 2017. Information about the sex of the victim is available starting from January 1, 2001. Mid-year population estimates, used to compute suicide rates, are from the Welsh government's website (https://statswales.gov.wales), and we linearly interpolate to obtain daily estimates.

2.2. Macroeconomic indicators and shocks

At regular intervals, private organisations and government agencies, such as the ONS (https://www.ons.gov.uk/), collect data and release statistics on the state of the UK economy. For example, once a month, the ONS releases information on the latest value of the unemployment rate to the public. Such announcements are scheduled in advance. The economics literature documents that investors in financial markets react to the surprises, or shocks, that they contain (Andersen et al., 2007). In line with this literature, we conjecture that the shock contained in a macroeconomic announcement is represented by the difference between the actual value taken by the macroeconomic indicator under observation (e.g. retail sales) and the value that had been expected by the public. Specifically, following Balduzzi et al. (2001), we measure a shock, S_{it}, to macroeconomic indicator i on day t as

$$S_{it} = \frac{A_{it} - F_{it}}{Std(A_i - F_i)} \tag{1}$$

where A_{it} represents the announced (i.e. actual) value of macroeconomic indicator i on day t, and F_{it} represents the value that the public had been expecting. The denominator in formula (1) normalises the shocks, or surprises, by dividing them by their sample standard deviation. This facilitates interpretation and ensures that the results can be compared directly across macroeconomic indicators.

An example can help clarify the logic behind formula (1). The following is an excerpt from an online article published by BBC News on November 16, 2006:

> "[Retail] sales jumped 0.9%, three times more than analysts forecast, and the biggest monthly gain since November 2005, the Office for National Statistics said."

Table 1
Summary statistics and variable definitions.

	count	mean	std	min	max	Definition
Panel A: Suicides						
Persons	7,670	13.481	3.935	2	31	
Males	6,209	10.043	3.363	1	28	
Females	6,209	3.243	1.825	0	12	
Panel B: Standardised macroeconomic shocks						
GDP	229	−0.098	1.000	−7.04	3.52	Growth rate in real gross domestic product (quarter-on-quarter), i.e. the market value of all finished goods and services produced over a period of time
Retail sales	251	0.218	1.000	−2.78	5.00	Growth rate in the volume of goods sold to the general public, excluding automotive fuel (month-over-month)
Consumer confidence	181	0.039	1.000	−2.61	3.73	Index measuring how optimistic households feel about the state of the economy and their personal finances, based on a survey
House prices	163	0.175	1.000	−3.31	3.98	Growth rate in Nationwide Building Society's house price index (month-over-month)
Unemployment rate	187	−0.128	1.000	−2.28	2.28	Number of individuals out of work who are actively looking for a job as a percentage of the economically active population
RPI	246	0.135	1.000	−3.12	4.37	Growth rate in the retail price index (month-over-month), which tracks the cost of a representative basket of retail goods and services
Panel C: Population (in 000s)						
Population	7,670	54675.78	2288.50	51486.06	58931.73	
Male population	7,670	26821.07	1240.53	25072.06	29119.05	
Female population	7,670	27854.70	1048.05	26414.01	29812.68	
Panel D: Control variables						
EPU	7,670	240.964	190.188	0.00	2660.72	Baker et al.'s (2016) economic policy uncertainty index for the UK. Daily values were available from 2001, and we estimated daily values between 1997 and 2000 by linear interpolation from monthly values. From https://www.policyuncertainty.com/
GPR	7,670	99.064	65.322	0.00	1045.60	Caldara and Iacoviello's (2022) global geopolitical risk index. From https://www.matteoiacoviello.com/gpr.htm
Misery	7,670	0.000	1.519	−2.28	4.03	Misery index, i.e. the sum of the z-scores of the unemployment rate and inflation rate (RPI) in the UK, as in Yang and Lester (1992). Both rates from https://www.ons.gov.uk/
Brent (%)	5,322	0.019	2.294	−19.89	18.13	Daily log return on crude oil (Europe Brent spot price FOB, USD per barrel). From https://www.eia.gov/
FTSE_All (%)	5,304	0.014	1.114	−8.71	8.81	Daily log return on the FTSE All-Share stock market index, representing about 98% of UK stock market capitalisation. From Bloomberg.
EffExchRate (%)	5,478	−0.002	0.434	−6.18	2.15	Daily log return on the nominal effective exchange rate index for the British pound (GBP), based on a basket of 60 economies' currencies. From https://www.bis.org/
FTSE_VIX	6,572	19.622	8.649	6.19	78.69	FTSE 100 volatility index, measuring the size of the fluctuations that investors expect in the UK stock market over the next 30 days. Available from 04/01/2000. On days when the market was closed (e.g. weekends), we estimated its values by linear interpolation. From Bloomberg.

Since retail sales measure the sales of goods and services to consumers, and more sales signal greater levels of economic activity, the above is an example of a *positive macroeconomic shock*. Analysts had forecast a +0.3% change (F) in retail sales for the period under observation, whereas the actual outcome turned out to be a more conspicuous +0.9% change (A). The non-normalised surprise, or forecast error, is equal to +0.6% ($=A-F$). In other words, the economy performed better than expected. Had the actual value of this macroeconomic indicator turned out to be, say, +0.1%, this would have represented a *negative macroeconomic shock*. Even if sales increased, their growth was less than projected.

We obtain the actual values (A) of all relevant UK macroeconomic indicators from Bloomberg, a major provider of economic data. As is common in the economics literature, as a proxy for F, we use the median forecasts of a sample of professional analysts, which we obtain from Bloomberg (Andersen et al., 2007). Analysts surveyed by Bloomberg typically submit their forecasts in the month preceding an announcement date, and Bloomberg publishes the resulting median during the week before the announcement (Chen et al., 2013). Since professional economic forecasts tend to reach the public via the mass media, we assume that, just before a scheduled announcement occurs, the public's expectations are in line with those of the "experts" (Mackuen et al., 1992).

We also conjecture that, unlike professional investors, the general public is likely to pay attention only to the most consequential economic metrics that have an impact on their own lives. This raises the question: which macroeconomic indicators matter the most to a layperson? To address this matter, we assume that public attention and media coverage go hand in hand, and consequently we employ the latter as a proxy for the former. Using the procedure described in Section A.1 of the online Appendix, we find that GDP, retail sales, consumer confidence, house prices, the unemployment rate, and the RPI are the indicators that receive the greatest amount of attention from news media in the UK. Consequently, we choose to focus on them in our analysis.

2.3. Hypothesis development

While economic factors are by no means the only driving forces behind suicidal behaviour, a stream of the literature contends that a portion of the variation in suicide rates can be attributed to economic variables. Hamermesh and Soss (1974) are the first to model the decision as to whether and when to commit suicide as a rational decision involving economic benefits and costs. Their approach relies on standard economic theory within the discounted lifetime utility framework. Specifically, they posit that the typical individual of age m derives utility (U) from consumption (C), which is a function of age and real permanent income (Y_p). The individual also derives disutility from the cost (K) of maintaining his health at an acceptable level, which is assumed to increase with age. Mathematically:

$$U_m = U\left[C(m, Y_p) - K(m)\right] \tag{2}$$

Therefore, the present value of the typical individual's expected lifetime utility at age α is

$$Z(\alpha, Y_p) = \int_{\alpha}^{\omega} e^{-r(m-\alpha)} U_m P(m)\, dm \tag{3}$$

where $P(m)$ represents the probability that the individual will survive to age m having survived to age α, r is the rate at which the individual discounts future utility, and ω represents the maximum attainable age.

The key assumption in the model is that individual i takes his own life

when

$$Z_i(\alpha, Y_p) < b_i \quad (4)$$

In other words, the individual commits suicide when the present value of his expected lifetime utility, $Z_i(\alpha, Y_p)$, falls below a given threshold that can be interpreted as his "distaste for suicide", b_i. The latter is an individual-specific parameter, and it can be used to capture, for example, demographic heterogeneity in suicide rates (e.g. males vs. females).

While "the concept of permanent income [Y_p] is [...] hard to define precisely" (Friedman, 1957), economists typically interpret it roughly as lifetime income or wealth. Since higher permanent income, Y_p, implies more consumption and, therefore, greater discounted lifetime utility ($\partial Z/\partial Y_p > 0$), the model predicts, as Hamermesh and Soss (1974) show, that the suicide rate is a decreasing function of permanent income. As such, this model can be used to analyse the impact on population suicide rates of any economic factors that may affect the permanent incomes of a large portion of the population. For instance, Wisniewski et al. (2020) examine the association between stock market fluctuations and suicides in a sample of 36 countries based on the assumption that the former is a determinant of permanent income.

Following an analogous line of reasoning, we conjecture that shocks to the six macroeconomic indicators in our sample affect people's estimated permanent incomes and, in turn, the suicide rate. This allows us to derive a set of testable hypotheses. (The analytical derivations are presented in section A.2 of the online Appendix.) Broadly, the hypotheses can be summarised as follows:

H1. There exists a negative relation between GDP growth, consumer confidence, house prices, retail sales and the suicide rate.

H2. There exists a positive relation between the unemployment rate and the suicide rate.

H3. There exists a positive (negative) relation between RPI and the suicide rate.

2.4. Model on suicide rate: identifying an exogenous source of variations

Our goal is to test the hypotheses and estimate, under a plausible set of assumptions, the *causal* impact on the suicide rate of the six macroeconomic factors. To achieve this, it is necessary to identify *plausibly exogenous sources of variation* in their values. In other words, the values of these indicators must be determined independently of other factors that may affect the suicide rate in a given time period. Simply regressing the suicide rate on the actual values (A) of these indicators would produce biased and inconsistent estimators of their causal effects due to omitted variable bias and simultaneity bias (Wooldridge, 2015). To circumvent these problems, we employ the following model:

$$SuicideRate_t = \alpha + \sum_{i=1}^{6} \beta_i S_{it} \times I_{it} + \boldsymbol{x}_t' \boldsymbol{\gamma} + \sum_{k=1}^{n} \varphi_k SuicideRate_{t-k} + \varepsilon_t \quad (5)$$

where $SuicideRate_t$ measures the suicide rate per 100,000 persons in England and Wales on day t, S_{it} measures the shock to macroeconomic indicator i on day t, and I_{it} is an indicator variable that takes the value of 1 if data about indicator i are announced on day t, and 0 otherwise.

According to formula (1), the sign and the size of a macroeconomic shock depend on the difference between how the economy *actually* performed and how it was *expected* to perform. Our identification strategy relies on the intuition that, if professional economic forecasts (F) are unbiased and efficient, then the forecast errors ($S = A - F$), or shocks, are "as good as random" (Card and Dahl, 2011). And if the shocks are as good as random, then they are assigned independently of any other unobservable factors that may determine the suicide rate on day t and end up in the error term, ε_t. Furthermore, as both A and F are determined prior to the announcement date t, they cannot be affected by suicides occurring on day t (reverse causation). Therefore, the zero conditional mean assumption, $E[\varepsilon|S, \boldsymbol{x}] = E[\varepsilon] = 0$, is satisfied (Wooldridge, 2015). In econometric terms, S_i is an exogenous variable. Under the assumptions mentioned above, the implication is that specification (5) can generate unbiased estimators of the *causal* effects of changes in the six macroeconomic indicators under observation.

While adding control variables to equation (5) is not necessary to identify these causal effects, to increase the efficiency of our estimators we add a vector of controls, $\boldsymbol{x}_t$. These consist of a linear time trend, seasonalities (holiday, day-of-the-week, and month-of-the-year dummies), and other variables inspired by the findings of previous studies (see Panel D of Table 1 for the list of variables and their definitions). We also add n lags of the dependent variable, where k denotes the lag and n is selected based on the Bayesian Information Criterion (BIC).

A natural question is whether macroeconomic shocks only have a contemporaneous effect on suicidal behaviour or they also influence the decision to take one's own life with a lag. To address this matter, we re-estimate equation (5) but with lags of each macroeconomic surprise indicator, S_i. We also consider the potential effects of *cumulative* shocks. Specifically, we re-estimate equation (5) with the addition of the explanatory variable *Cumulative_*S_i, which measures the sum of the shocks to macroeconomic indicator i over the previous 3–6 months.

2.5. Time-varying responses based on the state of the economy

Several studies find that the way investors in financial markets react to macroeconomic shocks depends on the state of the economy (Boyd et al., 2005; McQueen and Roley, 1993). We conjecture that a similar mechanism may be at play regarding suicidal behaviour among the general population: A negative piece of news during a period when the economy is performing well is more likely to be viewed with detachment, while negative news during a period of poor economic activity is more likely to lead to despair.

To investigate this hypothesis, we employ the misery index, i.e. the sum of the standardised unemployment and inflation rates in the UK (Yang and Lester, 1992), as a proxy for the state of the economy (Lee et al., 2007). High-misery periods signal that the economy has been doing poorly, while low-misery periods indicate that economy activity has been thriving. Specifically, we construct a dummy variable, *High_misery*, that takes the value of 1 when the misery index is above its sample median, and 0 otherwise. We then re-estimate equation (5) after adding to the right-hand side *High_misery* and interactions between *High_misery* and each S_i.

3. Empirical results

Panel A of Table 1 provides some summary statistics, and Figure A1 in the online Appendix displays the frequency distribution of daily suicides by sex. Summary statistics on the shocks experienced by the six indicators, as computed by formula (1), are displayed in Panel B of Table 1. On the average day, about 10 men and 3 women commit suicide. The total number of suicides varies between a minimum of 2 and a maximum of 31 per day. Overall, these statistics are in line with the findings of previous studies that focus on the same geographical area (Vandoros et al., 2019).

Since, in much of the analysis, our dependent variable measures the daily suicide rate per 100,000 persons, in Panel C of Table 1 we also display summary statistics on the size of the population in England and Wales. Figure A2 in the online Appendix displays the frequency distribution of shocks for each of the six indicators.

Before estimating equation (5), we find it useful to examine the quality of the sample of professional forecasts at our disposal. To do so, we run a set of unbiasedness, efficiency, and randomness tests (see Section A.3 in the online Appendix). The results reveal that the forecast errors (or shocks) concerning GDP growth, consumer confidence, and the unemployment rate pass all three quality tests with a clean bill, and

we can be quite confident that they are "as good as random". The shocks to house prices and RPI pass some of the tests. The shocks to retail sales raise more concerns, and we are less confident in their randomness. For this reason, while we conduct our main analysis using the shocks measured by formula (1), in Section A.9 of the online appendix we discuss some robustness tests that we run after debiasing the shocks to retail sales, house prices, and RPI, and we show that, with the exception of the effects of retail sales, our main findings are robust.

3.1. Baseline specification

A set of (untabulated) augmented Dickey-Fuller tests rejects the null hypothesis of a unit root at the 1% level for all but one of the continuous variables in model (5): *Misery*. We believe that the non-stationarity of the misery index is of no consequence in this study because, as we show later in Table 2, the inclusion/exclusion of this variable has no material impact on our results.

We estimate equation (5) by OLS and compute Newey and West (1987) standard errors with a lag truncation parameter of $T^{1/4}$ (T = number of observations), which are robust to heteroscedasticity and autocorrelation in the error term. The output is displayed in Table 2.

The analysis begins with a stripped-down specification that contains only the macroeconomic shocks, S_i (column 1), leading to *finding 1; consistent with hypotheses H1-H2, the signs of the coefficients on GDP, retail sales, consumer confidence, and house prices are negative, and the coefficient on the unemployment rate is positive. In other words, negative shocks to the aforementioned cause a contemporaneous increase in the daily suicide rate.* However, only the coefficients on retail sales, consumer confidence, and house prices are statistically significant at conventional levels. The coefficient on RPI is negative but statistically insignificant.

In columns 2–6, we gradually add a set of variables to control for a linear time trend, seasonal patterns in suicides, and daily economic/geopolitical factors that may influence individuals' well-being and suicidal behaviour. The overall fit of the model (adjusted R^2) increases with the addition of the controls, but the key results remain qualitatively unchanged.

To assess the extent to which the causal effects of macroeconomic shocks are practically meaningful, it is useful to transform suicide rates into suicide counts. According to the estimates in column 6 of Table 2, a negative one-standard-deviation surprise in the house price index increases the daily suicide rate by 0.00123. Since the sample average population in England and Wales is 54,675,780 (see Table 1), this is equivalent to an additional 0.67 suicides per day (=0.00123 ÷ 100,000 × 54,675,780). Relative to the sample mean daily suicide count (13.481), this represents a 4.97% increase. Similar to the effect of the house price index on the daily suicide rate, the effects of shocks to consumer confidence and retail sales are of the same order of magnitude.

It is worth noting that there is no near-multicollinearity among the macroeconomic surprise indicators, S_i's, in equation (5) (see Section A.4 in the online Appendix). Furthermore, imposing alternative time trends or replacing the original dependent variable with a measure of the abnormal daily suicide rate (= suicide rate on day t minus a 2-year moving average of the suicide rate) has no material impact on the main results (see Section A.5 in the online Appendix). Analogously, when we model the daily suicide count using a log-linear model or static and dynamic count-data models, we find that our results are robust (see Section A.6 in the online Appendix).

While equation (5) is concerned with contemporaneous effects, we also investigate whether macroeconomic shocks have lagged effects. We find no evidence that individual shocks exert lagged effects on suicidal behaviour. However, when we examine the effect of *cumulative* shocks, we find a statistically significant relationship between the suicide rate on day t and the sum of the shocks that house prices experienced during the previous 3–6 months. Namely, the more negative the sum of past shocks, the greater the increase in the suicide rate (see Section A.7 in the online Appendix).

Lastly, since analyst forecasts concerning house prices, RPI, and retail sales do not fully pass our unbiasedness and efficiency tests, we also re-estimate equation (5) after debiasing the corresponding shocks (see Section A.9 in the online Appendix). The results indicate that our findings are robust, with the exception of the effects of retail sales.

Table 2
Baseline specification.

	Hypothesis	Dependent variable: Daily suicide rate per 100,000 people					
		(1)	(2)	(3)	(4)	(5)	(6)
GDP	–	−0.000699 (−1.43)	−0.000624 (−1.33)	−0.000603 (−1.29)	−0.000584 (−1.24)	−0.000595 (−1.25)	−0.000601 (−1.25)
Retail sales	–	−0.00107*** (−2.70)	−0.000863** (−2.29)	−0.000854** (−2.26)	−0.000825** (−2.16)	−0.000731* (−1.93)	−0.000717* (−1.88)
Consumer confidence	–	−0.00112** (−2.06)	−0.00112** (−2.06)	−0.00115** (−2.12)	−0.00115** (−2.13)	−0.00112** (−2.07)	−0.00114** (−2.11)
House prices	–	−0.00137*** (−3.18)	−0.00125*** (−3.00)	−0.00122*** (−2.98)	−0.00123*** (−3.03)	−0.00121*** (−2.94)	−0.00123*** (−3.01)
Unemployment rate	+	0.000364 (0.72)	0.000175 (0.36)	0.000238 (0.48)	0.000242 (0.49)	0.000269 (0.54)	0.000296 (0.60)
RPI	+/−	−0.000533 (−1.25)	−0.000646 (−1.55)	−0.000636 (−1.53)	−0.000623 (−1.50)	−0.000727* (−1.66)	−0.000716 (−1.63)
Linear time trend		No	Yes	Yes	Yes	Yes	Yes
Seasonalities		No	Yes	Yes	Yes	Yes	Yes
ln(EPU) & ln(GPR)		No	No	Yes	Yes	Yes	Yes
Misery		No	No	Yes	Yes	Yes	Yes
Financial market returns		No	No	No	Yes	Yes	Yes
ln(FTSE_VIX)		No	No	No	No	Yes	Yes
Lags of dep. variable		No	No	No	No	No	Yes
N		7670	7670	7670	7670	6572	6572
Adj. R^2		0.002	0.095	0.104	0.104	0.080	0.081

Notes: Seasonalities consist of holiday, day-of-the-week, and month-of-the-year dummy variables. *EPU*, *GPR*, and *FTSE_VIX* enter the regressions in logarithmic form (1 is added to *EPU* and *GPR* before taking the logarithm because their values contain some zeros). Since *EPU's* daily values are estimated by linear interpolation from monthly values until December 31, 2000, the coefficient on ln(*EPU*) is allowed to vary between 1997-2000 and 2001–2017 by means of an interaction with a dummy variable taking the value of 0 before January 1, 2001, and 1 thereafter. Financial market returns consist of *Brent*, *FTSE_ALL*, and *EffExchRate*; each of these three variables is interacted with an indicator variable that takes the value of 1 when the market is open (and consequently a return is observed), and 0 otherwise. The number of lags of the dependent variable included in the model is based on BIC. See Table 1 for variable definitions. t statistics in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

3.2. Analysis by sex and state of the economy

The summary statistics in Table 1 show that, while males represent about half of the population, the number of male suicides is about three times as large as that of females. To examine whether the impact of macroeconomic shocks on suicidal behaviour varies between males and females, we re-estimate equation (5) separately for each of the two groups.

The estimates for the male population are displayed in Table 3. The set of controls included in the regression varies across columns 1–6 just like in Table 2, but the results are, to a very large extent, robust. *This leads to finding 2: a negative surprise in the RPI increases the male suicide rate. No evidence of an impact is present for the remaining macroeconomic indicators.* According to the estimates in column 6, a negative one-standard deviation surprise in the RPI raises the male suicide rate by 0.0018, which, based on the sample average male population, is equivalent to an extra 0.48 male suicides (=0.0018 ÷ 100,000 × 26,821,070) per day. Relative to the sample mean male suicide count (10.043 per day), this represents a 4.78% increase. As explained in Section A.2 of the online appendix, state pensions in the UK were pegged to the RPI for the majority of the sample period. As such, the sign of this effect is consistent with the interpretation that, conditional on the inflation experienced by older households (i.e. pensioner inflation), a surprise drop in the RPI represents an expected income drop in real terms. *From this perspective, the negative relation between RPI shocks and male suicides is therefore consistent with hypothesis H3 and Hamermesh and Soss's (1974) economic theory of suicide.*

The estimates for the female population are displayed in Table 4. *What emerges is that, (Finding 3) consistent with hypothesis H1, negative shocks to consumer confidence and house prices raise the female suicide rate. No evidence of an effect is present for the remaining macroeconomic indicators.* According to the estimates in column 6, a negative one-standard deviation surprise in the house price index raises the female suicide rate by 0.00128, which is equivalent to an extra 0.36 female suicides (=0.00128 ÷ 100,000 × 27,854,700) per day. Analogously, a negative one-standard deviation surprise in consumer confidence raises the female suicide rate by 0.00121, which is equivalent to an extra 0.34 female suicides per day. Relative to the sample mean female suicide count (3.243 per day), these two effects amount to an 11.10% and 10.48% increase, respectively. In summary, we find evidence that the response of suicidal behaviour to macroeconomic shocks varies between sexes (*finding 4*).

The left chart in Fig. 2 displays the point estimates and 95% and 90% confidence intervals of the coefficients on S_i by misery state. The estimates are further broken down by sex in the middle and right charts of the figure. (Note that the list of control variables is the same as in column 6 of Table 2, with the exclusion of the misery index.) For the general population, consistent with hypothesis *H1*, negative house price shocks raise the daily suicide rate both in good and bad economic times. A meaningful result is that negative shocks to GDP growth raise the suicide rate, but only in bad economic times is there evidence of this effect. Negative shocks to retail sales increase the suicide rate, but evidence of this effect is present only in bad economic times. (As mentioned earlier, our estimates of the effects of retail sales should be treated with caution because, as shown in Section A.9 of the online Appendix, they are not robust to debiasing the forecast errors.) And negative shocks to consumer confidence raise the suicide rate, but only in good economic times do we find statistical evidence of this effect. *This can be summarised as finding 5: there is evidence that the response of suicidal behaviour to macroeconomic shocks depends on the state of the economy. Specifically, only in bad (good) economic times do we find evidence that shocks to GDP growth (consumer confidence) have an immediate effect on the population suicide rate.*

Breaking down the results further by sex, we find evidence only among males that GDP growth (*H1*) and RPI (*H3*) shocks affect the suicide rate, while evidence in support of the effect of house price shocks (*H1*) is present only among females. Consumer confidence shocks (*H1*) seem to affect both sexes, but only in good economic times do we find statistical evidence of an impact.

In a further test, we also examine whether the response of the suicide rate to macroeconomic shocks varies depending on the state of public trust in government, and we find evidence that this is indeed the case (see Section A.8 in the online Appendix). While the resulting pattern of coefficients is similar to that in Fig. 2, one of the results that deserve attention concerns the effect of shocks to the unemployment rate: We find that, when public trust in government is low, surprise increases in the unemployment rate raise the suicide rate for females.

4. Discussion

To advance the literature on the relationship between macroeconomics and suicides, we use data to examine the effect of *macroeconomic surprises*, including changes to GDP growth, retail sales, consumer confidence, house prices, unemployment rate, and the RPI, on the daily incidence of suicides in England and Wales from 1997 to 2017. To the best of our knowledge, this is the first time the *causal effect* of

Table 3
Male suicide rate.

	Hypothesis	Dependent variable: Daily suicide rate per 100,000 males					
		(1)	(2)	(3)	(4)	(5)	(6)
GDP	–	−0.00122 (−1.48)	−0.00110 (−1.32)	−0.00109 (−1.30)	−0.00100 (−1.19)	−0.00103 (−1.22)	−0.00101 (−1.20)
Retail sales	–	−0.00127* (−1.74)	−0.00100 (−1.42)	−0.000960 (−1.36)	−0.000879 (−1.23)	−0.000850 (−1.19)	−0.000813 (−1.14)
Consumer confidence	–	−0.000885 (−0.91)	−0.00101 (−1.05)	−0.00102 (−1.06)	−0.00106 (−1.10)	−0.00104 (−1.08)	−0.00107 (−1.11)
House prices	–	−0.00125 (−1.58)	−0.00114 (−1.48)	−0.00113 (−1.47)	−0.00114 (−1.49)	−0.00112 (−1.46)	−0.00115 (−1.51)
Unemployment rate	+	0.000148 (0.17)	0.000137 (0.16)	0.000141 (0.16)	0.000147 (0.17)	0.000150 (0.17)	0.000185 (0.21)
RPI	+/−	−0.00153* (−1.84)	−0.00185** (−2.28)	−0.00190** (−2.34)	−0.00186** (−2.29)	−0.00184** (−2.26)	−0.00180** (−2.21)
Linear time trend		No	Yes	Yes	Yes	Yes	Yes
Seasonalities		No	Yes	Yes	Yes	Yes	Yes
ln(EPU) & ln(GPR)		No	No	Yes	Yes	Yes	Yes
Misery		No	No	Yes	Yes	Yes	Yes
Financial market returns		No	No	No	Yes	Yes	Yes
ln(FTSE_VIX)		No	No	No	No	Yes	Yes
Lags of dep. variable		No	No	No	No	No	Yes
N		6209	6209	6209	6209	6209	6208
Adj. R^2		0.001	0.051	0.052	0.052	0.052	0.053

Notes: *t* statistics in parentheses. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 4
Female suicide rate.

	Hypothesis	Dependent variable: Daily suicide rate per 100,000 females					
		(1)	(2)	(3)	(4)	(5)	(6)
GDP	–	−0.000178 (−0.44)	−0.000180 (−0.45)	−0.000181 (−0.46)	−0.000213 (−0.54)	−0.000230 (−0.58)	−0.000239 (−0.60)
Retail sales	–	−0.000647 (−1.59)	−0.000601 (−1.48)	−0.000598 (−1.48)	−0.000622 (−1.53)	−0.000603 (−1.48)	−0.000604 (−1.48)
Consumer confidence	–	−0.00131*** (−2.82)	−0.00122*** (−2.66)	−0.00123*** (−2.67)	−0.00122*** (−2.66)	−0.00121*** (−2.63)	−0.00121*** (−2.63)
House prices	–	−0.00126*** (−3.33)	−0.00125*** (−3.23)	−0.00128*** (−3.30)	−0.00129*** (−3.33)	−0.00128*** (−3.33)	−0.00128*** (−3.33)
Unemployment rate	+	0.000419 (0.94)	0.000356 (0.79)	0.000378 (0.84)	0.000387 (0.85)	0.000389 (0.86)	0.000392 (0.86)
RPI	+/−	0.000141 (0.34)	0.000173 (0.41)	0.000182 (0.43)	0.000166 (0.39)	0.000175 (0.41)	0.000172 (0.41)
Linear time trend		No	Yes	Yes	Yes	Yes	Yes
Seasonalities		No	Yes	Yes	Yes	Yes	Yes
ln(EPU) & ln(GPR)		No	No	Yes	Yes	Yes	Yes
Misery		No	No	Yes	Yes	Yes	Yes
Financial market returns		No	No	No	Yes	Yes	Yes
ln(FTSE_VIX)		No	No	No	No	Yes	Yes
Lags of dep. variable		No	No	No	No	No	Yes
N		6209	6209	6209	6209	6209	6208
Adj. R^2		0.002	0.026	0.029	0.029	0.029	0.029

Notes: *t* statistics in parentheses. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

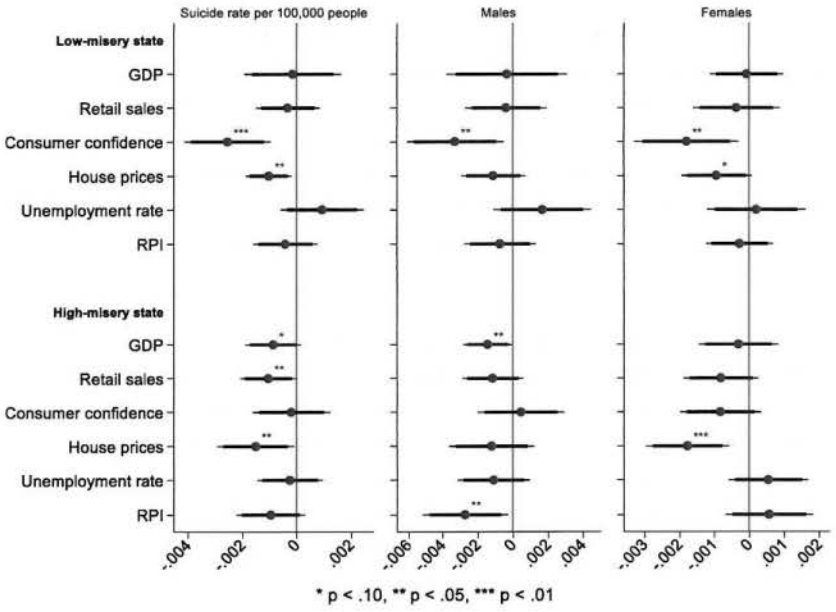


Fig. 2. Time-varying responses based on the state of the economy.

macroeconomic surprises on suicide has been described. In this regard, our findings can be compared and contrasted against the previous literature on macroeconomics, suicide and their *associations*.

Several pertinent findings emerge from our empirical analysis. Our results suggest that, at the population level, negative shocks to consumer confidence and house prices cause an immediate increase in the daily suicide rate. We also find that, under certain conditions and for certain groups (i.e. males or females), decreases in GDP growth or the RPI and increases in the unemployment rate raise the suicide rate. These effects are consistent with Hamermesh and Soss's (1974) economic theory of suicide. In this theory, shocks that reduce an individual's estimated permanent income, and therefore their expected lifetime utility, are found to increase suicides.

We find evidence of behavioural heterogeneity between sexes, which is consistent with prior research (Coope et al., 2014). In our study, at the aggregate level, the male suicide rate responds to changes in the RPI, while the female suicide rate responds to changes in consumer confidence and house prices. The latter result is consistent with a previous study, and the only known study, examining the *causal* relationship between consumer sentiment and suicides in the US. Although their methodology is different, their results are consistent with ours: as consumer sentiment decreases, the suicide rate increases, and this effect is stronger for females (Collins et al., 2021).

When the data are broken down by state of the economy, only in bad economic times do we find evidence that negative shocks to GDP growth raise the suicide rate, and the result is mainly driven by male suicides. The condition of 'in bad economic times' could explain why GDP per capita was not found to have an effect on suicide risk in a recent study in Japan (Okada et al., 2020). In our study, negative shocks to consumer confidence raise the suicide rate only during good economic times. This applies to both males and females. Negative shocks to house prices raise the suicide rate both in good and bad economic times, and the result is

mainly driven by female suicides.

Lastly, we also find evidence that the response of suicidal behaviour to macroeconomic shocks varies depending on the level of public trust in government, a finding that is consistent with the documented association between trust in government and mental health (Choi et al., 2023). One of the results that deserve attention is that only in the low-trust regime is there evidence that surprise increases in the unemployment rate raise the suicide rate for females.

While our analysis focuses on suicides, to put things in perspective, it is worth noting that successful suicides are only the tip of the iceberg. For instance, Weber et al. (2013) find that "[t]here are nearly 25 suicide attempts for each suicide", though estimates in the literature tend to vary between 10 to 1 and 40 to 1 (Miller et al., 2012). According to UK survey data, the ratio of suicide ideations to suicides is 200 to 1 (Gunnell et al., 2004). Extrapolating these figures to the present context suggests that a negative one-standard-deviation surprise in house prices leads to about 17 suicide attempts (=0.67 × 25) and 134 suicide ideations (=0.67 × 200) per day. This leads us to conclude that the impact of macroeconomic shocks on suicidal behaviour and suicidal thoughts is practically significant.

While most of the existing economics and public health literatures focus on the correlations (or associations) between economic factors and suicidal behaviour, we contribute to our understanding of their relation by quantifying causal effects under a plausible set of assumptions. We employ multiple modelling approaches (classical linear regression, static and dynamic count-data models) and show that our key results are robust to alternative methodological assumptions. We employ a large set of controls (calendar effects, dynamics of financial markets, economic policy uncertainty, geopolitical risk) that ensure the efficiency of our estimators. The sizes of the effects that we detect are practically meaningful: a one-standard-deviation surprise change in one of the macroeconomic indicators in our sample leads to a contemporaneous increase in the daily suicide count of between 4.8% and 11.1% relative to its sample average.

There are a few limitations. First, though we also consider the effects of cumulative shocks, our methodology and the time frequency of our data are geared towards detecting the *immediate*, i.e. short-term, effects of changing economic conditions on suicidal behaviour. Second, different segments of the population may have different degrees of exposure to the consequences of changing economic conditions. As our data are aggregated at the country level, we cannot estimate treatment effects for various sub-populations of interest, and we are unable to shed light on the potential moderating roles played by factors such as age, geographical location, income, job security, home ownership, social networks, and the like. Analogously, individual characteristics such as propensity to depression and risk-taking behaviour might act as moderators or mediators, but they are unobservable based on our dataset, and consequently our analysis is mute on this point. Third, we cannot observe the extent to which the public pays attention to macroeconomic announcements, nor can we observe the public's expectations about the macroeconomic indicators in our sample. When estimating exogenous macroeconomic shocks, our methodology relies on a proxy for public attention, i.e. media coverage, and a proxy for the public's expectations, i.e. professional analysts' forecasts. It seems reasonable to conjecture that a large segment of society is exposed to information (i.e. announcements and professional forecasts) about the macroeconomic indicators that are most widely covered by the news media. Nevertheless, it is possible that some of the individuals at risk of suicide or who died by suicide in our sample were unaware of this information or held expectations that significantly differed from those of the experts. Fourth, while we show that there is variation between sexes in how suicidal behaviour responds to economic shocks, our study is mute on the factors that may drive these heterogeneous reactions. And while all the effects that we detect are consistent with Hamermesh and Soss's (1974) economic theory of suicide, our analysis cannot explain why some macroeconomic indicators appear to be more important than others in driving suicidal behaviour. We leave it to future research to shed light on these issues. Lastly, the estimated causal effect of shocks to retail sales is not fully robust to the way the shocks are measured, and therefore the causal effect of retail sales on suicide should be interpreted with caution.

Due to their effect on suicide rate, macroeconomics can have a devastating impact on society. These findings have implications for policymakers, where policies have the potential to mitigate the relationship between macroeconomics and suicide (Shand et al., 2022). To inform intervention design and delivery, further evidence is necessary to understand how suicidal ideation following an economic announcement may result in an attempt on one's life. Several interventions, such as 'job club' interventions, can reduce depressive symptoms in high risk, unemployed people (Vuori and Vinokur, 2005). Similarly, an inverse relationship between financial support and suicide mortality was observed in Japan, suggesting that funding support should be responsive, particularly during bad economic times (Okada et al., 2020). Social media can play a powerful role in reducing the impact of negative economic announcements. In line with the clinical literature on help-seeking behaviour, the internet can act as a gateway to formal mental healthcare for at risk individuals, linking them to social care and wider financial support. Following public announcements on the state of the economy, pro-help-seeking messages can be broadcasted through social media outlets. By using tailor-made algorithms and the underlying structure of social media networks, internet-based interventions can increase their reach and engage at risk individuals, respectively (Notredame et al., 2018).

CRediT authorship contribution statement

Gabriele M. Lepori: Conceptualization, Data curation, Formal analysis, Methodology, Software, Validation, Visualization, Writing - original draft, Writing - review & editing. **Sara Morgan:** Conceptualization, Writing - original draft. **Borna A. Assarian:** Writing - original draft. **Tapas Mishra:** Writing - original draft, Writing - review & editing.

Declaration of competing interest

None.

Data availability

The data on suicide counts are freely available from the UK's ONS. Professional macroeconomic forecasts are available from Bloomberg upon subscription, and we do not have permission to share them.

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Appendix A. Supplementary data

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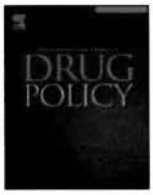
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Review

How economic recessions and unemployment affect illegal drug use: A systematic realist literature review



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ABSTRACT

Background: Economic recessions may influence illegal drug use via different mechanisms, for example increased use due to more psychological distress or decreased use due to lower incomes and purchasing power. This paper reviews the literature on how economic recessions and unemployment affect the use of illegal drugs among adults.
Methods: We conducted a systematic realist literature review, which is an explanatory method that aims to understand underlying mechanisms that connect an event to an outcome in a specific context. A systematic search was performed in EconLit, Embase, Medline, PsycINFO, SocIndex, and Web of Science for studies examining mechanisms explaining how recessions or unemployment affect illegal drug use.
Results: We synthesized 28 studies published between 1990 and 2015. Most evidence (17 studies) was found for the counter-cyclical mechanism that recessions and unemployment increase psychological distress, which increases drug use. Mainly supportive evidence for this mechanism was found in several high quality studies, in different contexts, and in a diverse number of countries and samples. In contrast, decreased income did not seem to decrease drug use (10 studies). Little evidence was available on the non-working time mechanism (4 studies) and the social exclusion mechanism (5 studies). Most of the studies that did examine these latter mechanisms confirmed the hypothesized counter-cyclical associations.
Conclusion: The current evidence is in line with the hypothesis that drug use increases in times of recession because unemployment increases psychological distress which increases drug use. During times of recession, psychological support for those who lost their job and are vulnerable to drug use (relapse) is likely to be important.
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Introduction

National and international economic recessions not only have financial and employment consequences for individuals living in those countries but also potential health consequences. During economic recessions, deteriorations in mental health and increases in suicides are observed at a population level (Catalano et al., 2011; Stuckler, Reeves, Karanikolos, & McKee, 2015; Uutela, 2010; Van Hal, 2015; Zivin, Paczkowski, & Galea, 2011). Both these outcomes are associated with illegal drug use (Miller, Mahler, & Gold, 1991; Sinha, 2008). Several studies have examined the relation between recessions and illegal drug use at the population level. Examples are studies that compare illegal drug use in the period before and after a recession (Colell, Sánchez-Niubò, Delclos, Benavides, & Domingo-Salvany, 2015; Lakhdar & Bastianic, 2011; Rossi et al., 2011), examine the association between unemployment rates and illegal drug use (Arkes, 2011; Chalmers & Ritter, 2011), and the association between income per capita or gross salary growth rates and illegal drug use (Chalmers & Ritter, 2011; Lakhdar & Bastianic, 2011). It is important to investigate not only whether economic recessions affect illegal drug use at the aggregate level, but also which individual-level mechanisms might produce these effects (Catalano et al., 2011; Stuckler et al., 2015). This question is of scientific interest, but also of practical interest, because an intervention or policy to prevent possible increases in illegal drug

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use during recessions cannot be properly designed when it is unknown which mechanisms this intervention or policy should target (Stuckler et al., 2015; Xu, 2013).

The individual-level mechanisms through which events produce effects can be synthesized with the realist review method (Pawson, Greenhalgh, Harvey, & Walshe, 2005; Pawson, 2006). Realist literature reviewing is an explanatory method that aims to examine how complex phenomena work, and in what contexts they occur. The method is especially useful for synthesizing methodologically diverse empirical studies. Realist reviews start with a clarification of the scope of the review and a first exploratory background literature search. Then, an initial theoretical framework is constructed that focuses on contexts, mechanisms, and outcomes, and sets out how and why phenomena have certain effects. In the next stage of a realist review, this theoretical framework is tested using empirical evidence from both quantitative and qualitative studies. Finally, the initial theoretical framework is revised.

An initial scoping search indicated that few studies have directly examined the relationship between economic recessions and illegal drug use. Thus, in our systematic realist literature review, we also included literature on the relationship between unemployment and illegal drugs. This was done because nine out of ten recessions coincide with increases in unemployment rates (Claessens, Kose, & Terrones, 2008) and because the same individual-level mechanisms that affect illegal drug use can apply to recessions and unemployment (Dubanowicz & Lemmens, 2015; Henkel, 2011).

In the current systematic realist literature review on how economic recessions and unemployment affect illegal drug use, the initial theoretical framework was constructed based on six key publications on the relationship between recessions or unemployment and illegal drug use or substance use in general (Bretteville-Jensen, 2011; Catalano et al., 2011; Dubanowicz & Lemmens, 2015; Falagas, Vouloumanou, Mavros, & Karageorgopoulos, 2009; Henkel, 2011; Ritter & Chalmers, 2011). In these publications, five potential mechanisms through which recessions or unemployment could affect illegal drug use were described (Fig. 1). Two of these mechanisms predict a *pro-cyclical effect*, which is a decrease in illegal drug use after the start of a recession. First, based on basic economic theory (Ruhm, 1995), one could expect decreased use of illegal drugs or use of cheaper drugs after the start of a recession, because individuals have reduced incomes and purchasing power, especially if they lose their job (Bretteville-Jensen, 2011; Catalano

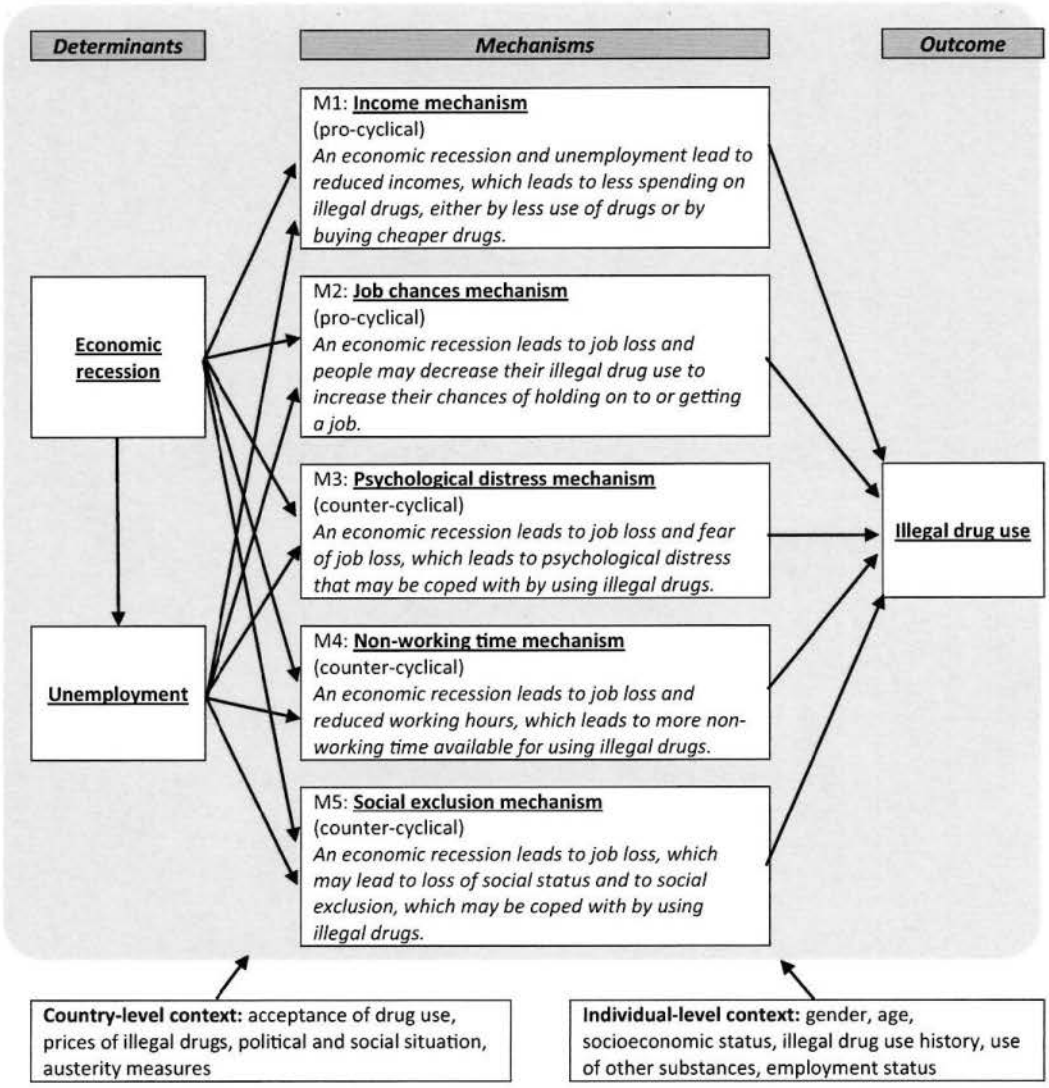


Fig. 1. Initial theoretical framework.

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et al., 2011; Dubanowicz & Lemmens, 2015; Henkel, 2011; Ritter & Chalmers, 2011). Second, use of illegal drugs may decrease after the start of a recession because not using illegal drugs can increase people's chances of holding on to their job or getting a job among those who are unemployed (Catalano et al., 2011; Henkel, 2011).

The other three mechanisms predict a *counter-cyclical effect*, which is an increase in illegal drug use after the start of a recession. First, a counter-cyclical effect may occur because psychological distress increases during a recession due to people losing their job or due to fear that they will lose their job. People may cope with this stress by using drugs (Bretteville-Jensen, 2011; Catalano et al., 2011; Dubanowicz & Lemmens, 2015; Falagas et al., 2009; Henkel, 2011; Ritter & Chalmers, 2011). Second, people might lose their job during a recession or their working hours might be reduced, which causes them to have more non-working time. This increases the time available for using drugs (Bretteville-Jensen, 2011; Dubanowicz & Lemmens, 2015; Ritter & Chalmers, 2011). The final mechanism from our initial theoretical framework hypothesizes that job loss due to a recession can lead to loss of social status and to social exclusion (Dubanowicz & Lemmens, 2015). People may cope with this loss by using illegal drugs.

The initial theoretical framework also contained information about contexts (Fig. 1), because the above mechanisms may not affect all individuals in the same way. It is possible that contrasting effects occur in sub-groups within a single population experiencing the same recession. For example, effects could be different for different age groups, for males and females, for people from different socioeconomic status groups, for people who have and who do not have a history of illegal drug use, and for employed versus unemployed individuals. Additionally, it is possible that certain mechanisms take place only in some country-level contexts (De Goeij et al., 2015). The extent of social acceptance of drug use, the prices of illegal drugs, the political and social situation, and the extent of austerity measures could, for example, play a role. Contexts can also interact with mechanisms to generate different outcomes. Therefore, in addition to examining mechanisms that explain how economic recessions influence illegal drug use, it is important to examine in which individual-level and country-level contexts these mechanisms occur. Moreover, effects may differ for different types of drugs. It is also important to take these differences into account, if there is sufficient empirical evidence available to make these distinctions.

In our systematic realist literature review, we aimed to answer the following question: How do economic recessions and unemployment affect the use of illegal drugs among adults?

Methods

Search strategy

After formulating the initial theoretical framework, we performed a systematic search using a keyword-based search strategy in six databases on 15 November 2015: EconLit (which contains literature from 1990 onwards), Embase (1974 onwards), Medline (1946 onwards), PsycINFO (1971 onwards), SocIndex (1972 onwards), and Web of Science (1950 onwards). Realist reviews often use an iterative search strategy that is refined during the review process (Wong, Westhorp, Pawson, & Greenhalgh, 2013). Our initial search used only search terms with synonyms for economic recession and illegal drug use and was used to screen relevant publications in order to obtain search terms for the five mechanisms and to verify whether we missed any individual-level mechanisms (which was not the case). The final search included keywords for economic recession and unemployment, at least one of the five mechanisms, and for the outcome illegal drug use. The keywords for illegal drug use included specific drugs such as cannabis; cocaine; ecstasy; and heroin; and more general keywords such as heavy drug use; illegal drug use; and illicit drug use. Table 1 shows all keywords used for our final search. The full search strategy is available online (Supplementary Table S1).

Selection of studies and extraction of relevant data

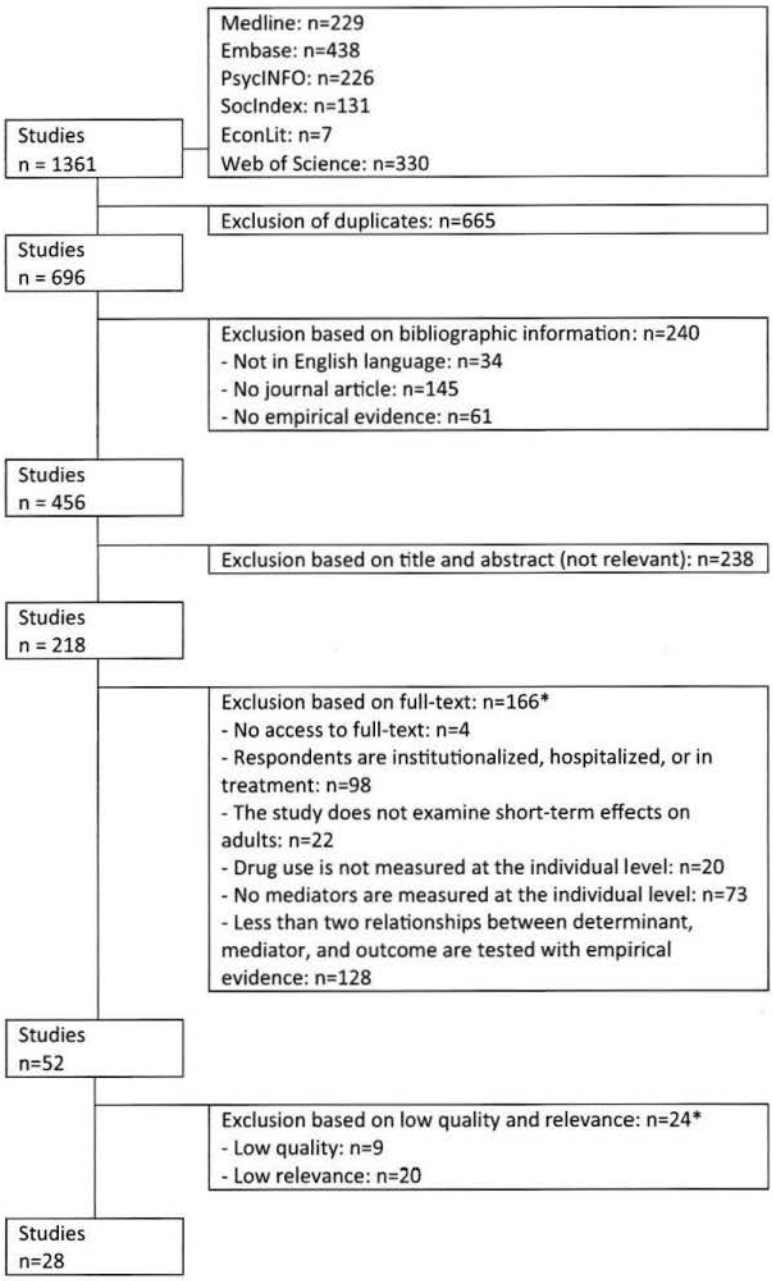
Fig. 2 shows the flow diagram of the selection of studies. The final search yielded 1361 studies published between 1970 and 2015. First, duplicate publications, publications that were not written in the English language, other publications than scientific journal articles (e.g. books and conference abstracts), and publications that did not contain empirical evidence (e.g. commentaries and review studies) were excluded. In standard systematic reviews some study designs (e.g. randomized controlled trials) are preferred over other study designs (e.g. qualitative studies). However, in realist reviewing, empirical evidence from any study design is considered important because multiple methods are needed to illuminate the richer picture of how contexts and interventions have an impact on outcomes (Pawson et al., 2005). Also, the limitation of one study can often be met with information from another study. Therefore, we included literature from any study design in our review.

After this first selection, 456 studies remained. The abstracts of those studies were coded on relevance (i.e. studies had to be about recession or unemployment and illegal drug use). The full-text of the 218 studies that were considered relevant were coded on five inclusion criteria:

1) Respondents are not institutionalized, hospitalized, or in treatment.
2) The study is about short- or medium-term effects among adults.
3) Drug use is measured at the individual level.
4) At least one of the mediators from the initial theoretical framework are present and they are measured at the individual level. Mediators were income, job chances, psychological distress, non-working time, or social exclusion.
5) At least two relationships between determinant, mediator, and outcome are tested with empirical evidence. Determinants were recession or unemployment and outcomes were use of

Table 1
Keywords used in systematic search.

Economic recession or unemployment	Austerity Measure*, Economic Cris*, Economic Decline*, Economic Downturn*, Economic Recession*, Financial Cris*, Financial Decline*, Financial Downturn*, Financial Recession*, Fiscal Cris*, Job loss, Loosing job, Unemploy*
Income mechanism	Economic constrain*, Income, GDP, Gross domestic product, GRP, Gross regional product, Pay*, Poverty, Wage*
Job chances mechanism	Job chance, Work chance, Job opportunit*, Work opportunit*
Psychological distress mechanism	Distress*, Strain*, Stress*, Mental health
Non-working time mechanism	Time use, Work* hour*, Work* time, Leisure-time, Leisure time
Social exclusion mechanism	Social status, Social exclusion, Social withdraw*, Social self-esteem
Illegal drug use	Amphetamine*, Cannabis*, Cocaine*, Ecstasy, Extasy, Heavy drug* use, Heroin*, Illegal drug*, Illicit drug*, Inject* drug*, Marihuana*, Marijuana*, Methamphetamine*, Xtc



* Some studies have been excluded on multiple grounds.

Fig. 2. Flow diagram of selection of studies.

illegal drugs (i.e. excluding legal use of pharmaceutical drugs, use of tobacco, and use of alcohol).

With respect to the second inclusion criterion, we only examine short- or medium-term effects because long-term effects are difficult to attribute to a recession or unemployment rather than to other life-events. Short- or medium-term is defined as five years or less. A study among adults is defined as the majority of the studied ages being 18 or older at the last studied survey wave (e.g. a study about 14–18 year olds is not included and a study about 16–24 year olds is included). The fifth inclusion criterion meant that some included studies tested the relationship between determinant and mediator and between mediator and outcome, other included studies tested the relationship between determinant and outcome and between determinant and mediator, and some included studies tested the relationship between determinant and outcome and between mediator and outcome. Studies that tested, for example, the relationship between mediator and outcome without

considering the determinant were not included. Studies that met all five criteria were included (n = 52).

The selection process was performed by the first author, the second author, and a research assistant independently (Cohen's Kappa = 0.57). Disagreement between codings were discussed until agreement was reached.

Relevant data on mechanisms from the 52 included studies were summarized in extraction tables by the first author. The second author checked the extraction tables. Results in the extraction tables were written as so-called context-mechanism-outcome configurations that describe in which context an economic recession or unemployment triggers individual-level mechanisms that lead to illegal drug use outcomes.

Appraisal of primary studies

The extraction tables of all included studies were independently rated by the first and second author during the appraisal process. In realist reviews, defensible judgements are made on the quality and relevance of the extracted data for the purpose of testing the theoretical framework, rather than using existing technical checklists for appraising the quality of entire studies (Wong et al., 2013).

The quality of the extracted data from the studies was rated by both coders as low, moderate, or high (Cohen's Kappa = 0.67). To make this classification for quantitative studies, we focused on study design (cross-sectional or longitudinal), size of study sample, participant selection procedure, operationalization of determinant, mediator(s), and outcome (clearly described or not), and adjustment for confounders (yes or no, for example gender, age, and health problems). To make this classification for qualitative studies, we focused on clarity of descriptions of context, description of participant selection, description of data collection and recording, description of the analyses, and on the credibility of the findings. The credibility of the findings was assessed by (re) reading the results section of the qualitative studies by both coders and judging whether the study provided sufficient original material to satisfy the reader about the relationship between data and interpretation (Green & Thorogood, 2014). The coding instruction is available online (Supplementary Table S2).

The relevance of the context-mechanism-outcome configurations was rated by both coders as low, moderate, or high (Cohen's Kappa = 0.63). To make this classification, we focused on the study population, operationalization of determinant, mediator(s), and outcome, which pathways were examined, and whether the order of the examined pathways was in line with our review question. To give some examples, studies about the general adult population or about a sample of drug users were rated as more relevant than studies about people who were just released from prison or who were in military service. Studies about unemployment-related stress and unemployment-related social exclusion were rated as more relevant than studies about general stress or general social exclusion.

Studies that were classified as low in quality and/or relevance for the purpose of our review were excluded (n = 24).

Analysis and synthesis

We conducted a narrative synthesis of 28 studies that were published between 1990 and 2015. The narrative was structured around the mechanisms in the initial theoretical framework (income mechanism, job chances mechanism, psychological distress mechanism, non-working time mechanism, and social exclusion mechanism) and by whether or not studies used data from during an economic recession. An economic recession was defined (Claessens & Kose, 2009) as two consecutive quarters of negative economic growth as measured by a country's real (inflation adjusted) Gross Domestic Product (Eurostat, n.d.; OECD, n.d.; Trading Economics, n.d.).

The analysis of each mechanism started with context-mechanism-outcome configurations that were coded as both high in relevance and high in quality. Subsequently, all other context-mechanism-outcome configurations were analyzed. The analyses were done by copying all these configurations to an Excel file and categorizing studies according to part of the mechanism that was examined, context, participant characteristics, operationalization of mediator, type of drugs, methodology used, and sample size. Consequently, patterns were identified by making frequent use of the realist review conceptual tools situating, reconciling, and adjudicating (Wong et al., 2013). Situating means viewing the evidence in light of the context in which it appears, for example the country in which the findings are found or the sample that is studied. Reconciling means identifying differences that explain contradictory findings. An example is that contradictory findings may be explained by different operationalizations of mediators or different types of drugs as outcomes. Adjudicating refers to taking account of the methodological quality or relevance of evidence when synthesizing findings. For example, when the hypothesized association is found in studies with large samples, but not significantly in studies with smaller samples, more weight was given to the former. The process of adjudicating meant that judgments about the relevance of context-mechanism-outcome configurations sometimes had to be adjusted during the analyses. During the analysis and synthesis process, the first and second author had regular discussions about the interpretations. The entire author team commented on several versions of the synthesis and confirmed the final synthesis.

Results

Study characteristics

An overview of the characteristics of the 28 included studies is given in Table 2. A description of the design and summary of relevant results for each individual study is given in Table 3.

Nine studies used data from during a recession (Bray, Zarkin, Dennis, & French, 2000; De Souza, Diaz, Sutmoller, & Bastos, 2002; Epele, 2010, 2011; Fergusson, McLeod, & Horwood, 2014; Kalousova & Burgard, 2014; Kramer, Booth, & Han, 2010; Melchior, Chollet, Elidemir, Galera, & Younes, 2015; Uggen & Shannon, 2014). Almost half of these studies examined respondents in the United States (n = 4) and were longitudinal surveys (n = 4). Nineteen studies used data that were not from during a recession but included participants who experienced unemployment (Arthur & Whitley, 2015; Atkinson, Montoya, Whitsett, Bell, & Nagy, 2003; Baggio et al., 2015; Bennett, Elliott, & Golub, 2013; Calcaterra, Beaty, Mueller, Min, & Binswanger, 2014; Cepeda et al., 2012; George, Kinner, Bruno, Degenhardt, & Dunn, 2010; Hammarström, 1994; Hammer & Vaglum, 1990; Jungerman et al., 2010; Parker, Weaver, & Calhoun, 1995; Pedersen, 2009; Rossi et al., 2011; Swift, Hall, & Teesson, 2001; Tomori et al., 2014; Topp, Hudson, & Maher, 2010; Wadsworth, Moss, Simpson, & Smith, 2004; Weston et al., 2009; Winter et al., 2015). These studies examined respondents in ten different countries, predominantly from the United States (n = 6) and Australia (n = 4). Almost half of these studies were cross-sectional surveys (n = 9).

Of all examined studies, 21 used quantitative methods (Atkinson et al., 2003; Baggio et al., 2015; Bray et al., 2000; Calcaterra et al., 2014; Cepeda et al., 2012; De Souza et al., 2002; Fergusson et al., 2014; George et al., 2010; Hammer & Vaglum, 1990; Jungerman et al., 2010; Kalousova & Burgard, 2014; Kramer et al., 2010; Melchior et al., 2015; Parker et al., 1995; Pedersen,

2009; Rossi et al., 2011; Swift et al., 2001; Topp et al., 2010; Wadsworth et al., 2004; Weston et al., 2009; Winter et al., 2015), six studies used qualitative methods (Arthur & Whitley, 2015; Bennett et al., 2013; Epele 2010, 2011; Tomori et al., 2014; Uggen & Shannon, 2014), and one study used both quantitative and qualitative methods (Hammarström, 1994). The psychological distress mechanism was examined in most studies (n = 17), followed by the income mechanism (n = 10), while the social exclusion mechanism (n = 5) and the non-working time mechanism (n = 4) were studied less often. No studies examined the job chances mechanism. Most studies examined only one of the mechanisms (n = 21).

Income mechanism (pro-cyclical)

Studies with data from during a recession

Six studies examined the income mechanism with data that were collected during an economic recession. Of those six studies, one qualitative study (Epele, 2010) and one quantitative study (Kalousova & Burgard, 2014) were judged to have high relevance and quality for testing the income mechanism.

The qualitative study was performed among active drug users and members of their social networks from a shantytown in Buenos Aires during the 2001–2002 recession (Epele, 2010). The recession was regarded to have caused a reduction in resources and cash among drug users. This led to the substitution of cocaine with psychotropic pills, marijuana, free-base cocaine, and alcohol. Members of the social networks of drug users saw psychotropic pill users as people who are poor and have no resources to get high on cocaine. This study was the only one that described the broader population-level context of prices, availability, and quality of drugs. According to the interviewed drug users, the quality of cocaine deteriorated during the recession, cocaine became scarcer, and more expensive. The price was not always the main reason for switching to psychotropic pills; many former cocaine users took psychotropic pills because the quality of cocaine became so poor that they worried about the health damage caused by dangerous toxins mixed with cheaper quality cocaine. Additionally, some prescription medications became extremely scarce and people started substituting one medicine for another and took combinations of psychotropic pills with illegal drugs or alcohol when they could not get hold of the prescription medicine they needed. A related qualitative study that was performed in the same period and region found that free-base cocaine was seen as a "drug of the poor" (Epele, 2011). Free-base cocaine started to spread a few months after the start of the recession and initially had a much lower selling price than regular cocaine.

The quantitative study was performed during the aftermath of the 2007–2009 recession in Southeast Michigan (Kalousova &

Table 2
Characteristics of the included studies.

	Studies with data from during an economic recession (n = 9)	Studies with data not from during an economic recession (n = 19)
Examined country		
Argentina	2	1
Australia	0	4
Brazil	1	1
France	1	0
Jamaica	0	1
New Zealand	1	0
Norway	0	2
Sweden	0	1
Switzerland	0	1
United States	4	6
Vietnam	0	1
Wales	0	1
Year published		
1990–1995	0	3
1996–2000	1	0
2001–2005	1	3
2006–2010	2	5
2011–2015	5	8
Study design		
Cross-sectional survey	2	9
Longitudinal survey	4	6
Qualitative interviews	1	3
Ethnographic fieldwork	2	0
Quantitative and qualitative methods	0	1
Which mechanisms examined		
Income mechanism	6	4
Job chances mechanism	0	0
Psychological distress mechanism	3	14
Non-working time mechanism	2	2
Social exclusion mechanism	2	3
Number of mechanisms examined		
1 mechanism	6	15
2 mechanisms	2	4
3 mechanisms	1	0
4 mechanisms	0	0
5 mechanisms	0	0

Table 3
Descriptions of design and summary of relevant results of the included studies.

Reference	Location	Design	Study population	Summary of relevant results for testing our framework [including quality and relevance]
Studies performed during an economic recession				
Bray et al. (2000)	United States	Cross-sectional survey	Population aged 25–54 years who were not on active military duty, not enrolled in school, not disabled, and not retired (n = 34,805)	• Among men, use of marijuana and other illicit drugs with and without symptoms of dependence was associated with a lower likelihood of working full-time and less hours worked in the past month among those currently employed. In multivariate analyses, the association between marijuana use without symptoms and hours worked in the past month, the association between other illicit drug use with symptoms and working full-time, and the association between other illicit drug use with symptoms and hours worked in the past month remained significant. Among women, only the negative association between marijuana use without symptoms and working full-time was significant in multivariate analyses. [quality = high, relevance = high]
De Souza et al. (2002)	Brazil, Rio de Janeiro	Cross-sectional survey	HIV-negative men who have sex with men aged 18–50 years (n = 675)	• Lower income (below the poverty level) was associated with a higher likelihood of crack/cocaine use with sexual activity. [quality = moderate, relevance = moderate]
Epele (2010)	Argentina, Buenos Aires	Ethnographic fieldwork	Active drug users from a shantytown aged 18–43 years (n = 60), former drug users, and members of the users' extended social networks	• Among former drug users, psychotropic pill users were seen as people who are poor, marginalized, and have no resources to get high on cocaine. [quality = high, relevance = high] • Among drug users, the reduction in resources through both legal and illegal means and the dearth of cash and goods that could be traded for drugs after the start of the economic recession have fostered the substitution of cocaine with psychotropic pills, marijuana, free-base cocaine, and alcohol. According to users the substitution for cocaine by other substances was tied to the fact that cocaine was expensive and of poor quality. [quality = high, relevance = high] • Among members of the social networks of drug users, drug consumption was explained as a way to escape and forget their social and daily reality, which has become overwhelming and unbearable. [quality = high, relevance = high] • Women without a history of drug use took benzodiazepines to "calm down" and decrease anxiety, panic attacks, insomnia, and despair. [quality = high, relevance = high]
Epele (2011)	Argentina, Buenos Aires	Ethnographic fieldwork	Active drug users from three neighborhoods aged 18–45 years (n = 40)	• Free-base cocaine was seen as the drug "of the poor" and was used by marginalized populations. [quality = moderate, relevance = moderate]
Fergusson et al. (2014)	New Zealand, Christchurch	Longitudinal survey	A birth cohort born in Christchurch in 1977, who have been studied at ages 18, 21, 25, and 30 and have been surveyed on at least one occasion (n = 1056)	• Duration of unemployment was associated with a higher likelihood of major depression, but not with a higher likelihood of anxiety disorder. [quality = moderate, relevance = high]
Kalousova & Burgard (2014)	United States, Southeast Michigan	Longitudinal survey	Population aged 19–64 year who were surveyed in 2009/2010 and in 2011 (n = 914)	• Unemployment experience was associated with a lower median income. [quality = high, relevance = high] • Measured decrease in economic resources was not associated with adoption of marijuana. However, when unemployment, measured, and perceived decrease in economic resources were added to the same model, measured decrease in economic resources was associated with a lower likelihood of adoption of marijuana. [quality = high, relevance = high] • Higher household income was associated with a lower likelihood of adoption of marijuana. [quality = high, relevance = high]
Kramer et al. (2010)	United States, Arkansas	Longitudinal survey	Rural African American young adults aged 18–21 years who used cocaine or methamphetamine and were followed for 2 years (n = 92)	• Income in the past year before the recession was not associated with cocaine abuse/dependence diagnostic group during the recession. [quality = moderate, relevance = moderate]
Melchior et al. (2015)	France	Longitudinal survey	Community sample of young adults aged 18–35 years (n = 1,126)	• Social support was not associated with cannabis use and abuse in the past 12 months. [quality = moderate, relevance = moderate]

Table 3 (*Continued*)

Reference	Location	Design	Study population	Summary of relevant results for testing our framework [including quality and relevance]
				• Anxiety or depression in the past 12 months was not associated with cannabis use and abuse in the past 12 months. [quality = moderate, relevance = moderate]
Uggen & Shannon (2014)	United States, Minnesota	Qualitative individual interviews	Young adults aged 18–25 years leaving inpatient chemical dependency treatment (n = 29)	• Income from employment sometimes increased drug use. [quality = moderate, relevance = moderate] • Employment provided stability, structure, and kept them busy, which prevented employed young adults from using drugs again. [quality = moderate, relevance = moderate] • Employment provided sober peer networks, healthy social contacts, and positive social relationships. [quality = moderate, relevance = moderate]
Studies not performed during an economic recession				
Arthur & Whitley (2015)	Jamaica	Qualitative focus group interviews	Community members, patients and caregivers at outpatient mental health clinics aged 18 years and older (n = 159)	• Financial challenges, the level of the economy, and job loss were described as a source of stress that caused mental illness. [quality = high, relevance = high]
Atkinson et al. (2003)	United States, Houston	Longitudinal survey	Female welfare recipients aged 18 years and older who were followed up at 4, 8, 12, 16, 20 and 24 months (n = 362)	• Drug use prior to intake was associated with higher psychological distress at intake and with higher psychological distress at one year. Psychological distress at intake and one year was not associated with drug use in the following four months. [quality = moderate, relevance = moderate]
Baggio et al. (2015)	Switzerland	Longitudinal survey	Young men aged 17 to 27 years surveyed at baseline and 1-3 years later (n = 4,758)	• Unemployment at baseline was not associated with depressive symptoms and mental disability at follow-up. However, depressive symptoms and mental disability at baseline were associated with unemployment at follow-up. [quality = high, relevance = high]
Bennett et al. (2013)	United States, New York City area	Qualitative individual interviews and focus group interviews	Recently separated, formerly enlisted (OIF-OEF) veterans living predominately in low-income neighborhoods (n = 40)	• Substance use was a form of coping with unemployment and homelessness. [quality = high, relevance = high]
Calcaterra et al. (2014)	United States, Denver	Longitudinal survey	Former prisoners released to Denver, who were surveyed 1–3 weeks post prison release and 2–9 months after (n = 155)	• Major depression at baseline was associated with a higher likelihood of drug use in the past month at follow-up. [quality = moderate, relevance = moderate]
Cepeda et al. (2012)	United States	Cross-sectional survey	Mexican American non-injecting heroin users aged 16–40 years (n = 300)	• Unemployment was not associated with depression symptomatology. [quality = moderate, relevance = high] • Depression symptomatology was associated with a higher likelihood of Heroin injecting transition risk. [quality = moderate, relevance = high]
George et al. (2010)	Australia	Cross-sectional survey	Regular ecstasy users aged 16 years and older (n = 740)	• Unemployment was associated with a higher likelihood of psychological distress. [quality = moderate, relevance = high] • Medium levels of psychological distress (compared to low levels) were associated with a higher likelihood of recent binge drug use and use of cannabis more than once a week. High levels of psychological distress (compared to low levels) were associated with a higher likelihood of recent binge drug use. Psychological distress was not associated with the other drug variables in multivariate analyses that adjusted for sociodemographic characteristics. [quality = moderate, relevance = high]
Hammarström (1994)	Sweden, the municipality of Luleå	Longitudinal survey	Final-year students aged 16 years at baseline and 21 years at follow-up (n = 1,060)	• Long-term unemployment between baseline and follow-up was associated with more psychological symptoms (both among males and females at age 16 and 21). This was also found in a multivariate analysis. [quality = moderate, relevance = moderate] • Long-term unemployment between baseline and follow-up was associated with a larger increase in psychological symptoms between baseline and follow-up among both males and females (not reported whether this increase is significant). [quality = moderate, relevance = moderate]
		Qualitative individual interviews	Final-year students aged 21 years who had been long-term unemployed during a 5-year period (n = 169)	• Stress and depressive feelings were described as a consequence of unemployment. [quality = moderate, relevance = moderate]

Table 3 (*Continued*)

Reference	Location	Design	Study population	Summary of relevant results for testing our framework [including quality and relevance]
				• Unemployment led to passivity, not wanting to go out, and isolation. [quality = moderate, relevance = moderate]
Hammer & Vaglum (1990)	Norway	Longitudinal survey	Young people aged 17–20 years at baseline who were followed up 2 years later (n = 1,590)	• Less social integration was associated with a higher likelihood of ever use of cannabis at follow-up. Ever users of cannabis were less involved in organized activities in their leisure time, they exercised less, and they were less frequently engaged in social contacts with close friends. [quality = high, relevance = moderate] • Psychological problems at baseline and at follow-up were associated with a higher likelihood of ever use of cannabis at follow-up. This was only found for those who had used cannabis more than five times. [quality = high, relevance = high] • Psychological problems at baseline and at follow-up were not associated with continued use of cannabis at follow-up. However, among the subgroup who was unemployed at baseline, psychological problems at follow-up were associated with a higher likelihood of continued use of cannabis at follow-up. [quality = high, relevance = high]
Jungerman et al. (2010)	Brazil	Cross-sectional survey	Population aged 14–65 years (n = 3,006)	• Having an income of $243 or less was not associated with cannabis use in the multivariate analysis. [quality = moderate, relevance = moderate]
Parker et al. (1995)	United States	Cross-sectional survey	Population aged 12 years and older (n = 8814)	• Higher income was associated with a higher likelihood of drug use, but this was not significant in multivariate analyses. This was found for all racial groups (black, Hispanic, and white). [quality = high, relevance = moderate]
Pedersen (2009)	Norway	Longitudinal survey	Young adults aged 25–31 years (n = 1360)	• Income was not associated with ever cannabis use, but low income was associated with a higher likelihood of cannabis use in the past 12 months. [quality = moderate, relevance = moderate]
Rossi et al. (2011)	Argentina, Buenos Aires	Cross-sectional survey	Young adults aged 21–35 years who had been active drug users in the past three years (n = 235)	• A decrease in mean hours per week spent at work or not working was associated with a larger increase in mean hours per week spent using drugs. Among the same group, an increase in mean hours per week spent looking for work was associated with a larger increase in mean hours per week spent using drugs. [quality = moderate, relevance = high]
Swift et al. (2001)	Australia	Cross-sectional survey	Population aged 18 years and older (n = 10,641)	• Affective disorders and anxiety disorders were associated with more dependent use of cannabis and with more non-dependent cannabis use in the past year in bivariate analyses. In multivariate analyses, only affective disorders were associated with more dependent use of cannabis and with more non-dependent cannabis use in the past year. [quality = high, relevance = high]
Tomori et al. (2014)	Vietnam, Hanoi	Qualitative individual interviews	Male injecting drug users released within the past 2 years from "06 centers" (n = 43)	• Unemployment led to social exclusion, because it limited their ability to engage in a wider network of social interactions beyond their families. [quality = high, relevance = high] • Social exclusion and stigmatization prompted episodes of drug use relapse or exacerbated struggles with drug addiction. Sometimes, social isolation in the community triggered men to meet old drug user friends, this offered support from social isolation but also prompted relapse. [quality = high, relevance = moderate] • The inability to find employment was perceived as prompting drug use relapse or exacerbating their struggles with drug addiction. Also, the psychological stress from unemployment or having a job with low pay prompted relapse. [quality = high, relevance = high] • Unemployment had a negative psychological impact, which led to pressure and stress. [quality = high, relevance = high]
Topp et al. (2010)		Cross-sectional survey	Street-based psychostimulant injectors aged 16 years or older (n = 183)	• Current unemployment was associated with more psychological distress in the past four weeks in a

Table 3 (*Continued*)

Reference	Location	Design	Study population	Summary of relevant results for testing our framework [including quality and relevance]
	Australia, Sydney, Kings Cross			bivariate analysis. In a multivariate analysis, the association was borderline significant. [quality = moderate, relevance = high] • A higher injection frequency in the last month, use of heroin in the last six months, use of other opiates in the last six months, more number of drugs used in the last six months, more number of drugs ever injected, more number of drugs injected in the last six months, and a lower age at first drug injecting was associated with more psychological distress in the past four weeks in bivariate analyses. All other drug use variables were not associated with psychological distress in bivariate analyses. In multivariate analyses, no drug use variables remained associated with psychological distress. [quality = moderate, relevance = high]
Wadsworth et al. (2004)	Wales, Cardiff and Merthyr Tydfil	Cross-sectional survey	Population aged 16–97 years (n = 7979)	• Anxiety and stress but not depression were associated with illicit drug use in the last year in bivariate analyses (direction of association not reported), but not in multivariate analyses. [quality = high, relevance = high] • Income was associated with illicit drug use in the last year in bivariate analyses (direction of association not reported), but not in multivariate analyses. [quality = high, relevance = moderate]
Weston et al. (2009)	United States, Milwaukee inner city	Cross-sectional survey	African Americans aged 20–56 years (n = 389)	• Part-time employment was associated with a higher likelihood of testing positive for cocaine use than full-time employment, but was not associated with cocaine use in the multivariate analysis. [quality = moderate, relevance = moderate]
Winter et al. (2015)	Australia, Queensland	Longitudinal survey	Adult prisoners who were interviewed prior to release and 1, 3, and 6 months post-release (n = 891)	• Very high psychological distress was associated with a higher likelihood of post-release non-fatal overdose. [quality = moderate, relevance = moderate]

Burgard, 2014). People who had been unemployed for at least one month between the two longitudinal surveys in 2009/2010 and 2011 had lower median household income at follow-up. Lower household income was associated with a higher likelihood of initiating marijuana at follow-up. The study also examined whether people experienced a decrease in economic resources between 2008 and 2010 by constructing an income-to-needs ratio. This decrease in economic resources was not associated with initiating marijuana in a bivariate analysis, but it was associated with a lower likelihood of initiating marijuana in a multivariate analysis.

A longitudinal study among rural African American young adults from Arkansas who used cocaine or methamphetamine before the 2007–2009 recession found no significant association between income and cocaine dependence (Kramer et al., 2010). However, young adults who were leaving chemical dependency treatment in Minnesota during the 2007–2009 recession explained in qualitative interviews that income from employment sometimes increased drug use (Uggen & Shannon, 2014). It was not reported in the study whether a reduction in income decreased drug use. In a cross-sectional study from Rio de Janeiro during the 1998–1999 recession among HIV-negative men who have sex with men, low income was associated with a higher likelihood of crack and/or cocaine use in combination with sexual activity (De Souza et al., 2002).

Studies with data not from during a recession

Four cross-sectional studies examined the income mechanism with data from studies about unemployment. Three of them were population surveys with a large number of respondents from the United States (Parker et al., 1995), Wales (Wadsworth et al., 2004), and Brazil (Jungerman et al., 2010). All of these studies did not find a significant association between income and drug use in general (Parker et al., 1995; Wadsworth et al., 2004) or cannabis use (Jungerman et al., 2010).

One study did find a significant association between income and drug use. In a study among Norwegian adults, low income was associated with a higher likelihood of cannabis use in the past year (Pederson, 2009).

Psychological distress mechanism (counter-cyclical)

Studies with data from during a recession

The psychological distress mechanism was examined in three studies that were performed during an economic recession. One of these studies was coded as high in relevance and quality for testing the psychological distress mechanism (Epele, 2010). This ethnographic study reported that members of the social network of drug users in Buenos Aires described that the daily reality of drug users became overwhelming and unbearable after the start of the 2001–2003 recession. Drug consumption was seen as a way to escape and forget this reality. Additionally, women without a history of drug use reported taking benzodiazepines (with or without medical prescription) to "calm down" and decrease anxiety, panic attacks, insomnia, and despair.

The other two studies were longitudinal surveys. Fergusson et al. (2014) followed a birth cohort from New Zealand from age 18 to age 30. During these thirteen years, two recessions took place (1997–1998 and 2007–2010). It was found that a higher duration of unemployment was significantly associated with a higher likelihood of major depression, but duration of unemployment was not significantly associated with anxiety disorders. The study did not correlate major depression and anxiety disorders with drug use, it only correlated the direct effect of unemployment with drug use

(which is not the focus of this review). Among young adults from France during the 2008–2009 recession, experiencing anxiety and/or depression was not significantly associated with cannabis use nor with cannabis abuse (Melchior et al., 2015).

Studies with data not from during a recession

Fourteen studies that examined the psychological distress mechanism used data from studies about unemployment instead of recession. Two qualitative studies (Bennett et al., 2013; Tomori et al., 2014) and one quantitative longitudinal study (Hammer & Vaglum, 1990) were judged to have high relevance and quality for examining the psychological distress mechanism and examined the entire mechanism from unemployment to psychological distress to drug use. These three studies were performed in very different contexts. The first qualitative study examined recently separated, formerly enlisted Operation Iraqi Freedom – Operation Enduring Freedom (OIF-OEF) veterans living in low-income neighbourhoods of New York City (Bennett et al., 2013). The second qualitative study examined male injecting drug users from Vietnam who were just released from detainment in detoxification centers (Tomori et al., 2014). The longitudinal study examined young people aged 17–20 years in Norway, who were followed up two years later (Hammer & Vaglum, 1990). The findings from these three studies, although executed in very different contexts, were all in line with the psychological distress mechanism. The OIF-OEF veterans described drug use as a form of coping with unemployment and homelessness (Bennett et al., 2013). The male injecting drug users from Vietnam described that unemployment led to pressure and stress and that the stress prompted relapse into drug use when they were released from detainment in detoxification centers (Tomori et al., 2014). Additionally, among the subgroup of young people from Norway who were unemployed at baseline, psychological problems at follow-up were associated with a higher likelihood of continued use of cannabis at follow-up (Hammer & Vaglum, 1990). This association was not found among those who were employed at baseline.

In other studies, associations between unemployment and mediators were either positive (i.e. unemployment associated with more stress; Arthur & Whitley, 2015; George et al., 2010; Hammarström, 1994; Topp et al., 2010) or not significant (Baggio et al., 2015; Cepeda et al., 2012). There were no studies that found negative associations. The non-significant findings were found among studies that examined depressive symptoms and mental disability instead of stress as mediators. The positive associations between unemployment and mediator were found in a diverse number of countries: Jamaica (Arthur & Whitley, 2015), Australia (George et al., 2010; Topp et al., 2010), Sweden (Hammarström, 1994), the United States (Bennett et al., 2013), Vietnam (Tomori et al., 2014), and Norway (Hammer & Vaglum, 1990). And they were found among drug user samples (George et al., 2010; Tomori et al., 2014; Topp et al., 2010), young people (Hammarström, 1994; Hammer & Vaglum, 1990), veterans (Bennett et al., 2013), and community members and patients and caregivers at outpatient mental health clinics (Arthur & Whitley, 2015). Only one study reported subgroup analyses (Hammarström, 1994) and found similar effects among males and females and ages 16 and 21 years old.

Finally, associations between mediator and drug use outcomes were also examined. Associations that were found were either positive (i.e. stress associated with a higher likelihood of drug use; Calceterra et al., 2014; Cepeda et al., 2012; George et al., 2010; Swift et al., 2001; Winter et al., 2015) or not significant (Atkinson et al., 2003; George et al., 2010; Swift et al., 2001; Topp et al., 2010; Wadsworth et al., 2004). No consistent patterns were apparent in type of mediator or type of drug use outcome and whether associations were positive or non-significant. Positive associations between mediator and drug use were found among drug users in the United States (Cepeda et al., 2012), Australia (George et al., 2010), and Vietnam (Tomori et al., 2014), among the population in Australia (Swift et al., 2001), among young people from Norway (Hammer & Vaglum, 1990), among former prisoners in the United States (Calceterra et al., 2014) and Australia (Winter et al., 2015), and among veterans in the United States (Bennett et al., 2013). No studies reported subgroup analyses. Most studies only examined associations between unemployment and mediators or between mediators and drug use outcomes. These studies were included in the review because they also examined the relationship between unemployment and drug use.

Non-working time mechanism (counter-cyclical)

Studies with data from during a recession

Two of the included studies examined the non-working time mechanism with data that were collected during an economic recession. Both studies were performed in the United States. Young adults who were leaving chemical dependency treatment in Minnesota during the 2007–2009 recession explained in qualitative interviews that when they had a job, this provided stability and structure, and it kept them busy, which prevented them from relapsing into drug use (Uggen & Shannon, 2014). A cross-sectional survey study among a large sample of working-age adults (25–54 years) during the 1990–1991 recession found significant associations between working part-time and having worked fewer hours in the past month with a higher likelihood of using marijuana and other illicit drugs, among men who were currently employed (Bray et al., 2000). Among women who were currently employed, only the association between working part-time and a higher likelihood of using marijuana was significant. The associations with having worked fewer hours in the past month and with other illicit drug use were not significant.

Studies with data not from during a recession

Two small-scale cross-sectional studies examined the non-working time mechanism with data that were not collected during an economic recession. The data from the first study were collected from 2003 to 2005 in Argentina (Rossi et al., 2011), which was soon after the end of the 2001–2002 recession. Respondents from this study were asked about their time use in a typical week at present and in a typical week three years ago. Respondents were young adults who were active drug users at the time of the study or three years ago from impoverished drug-impacted neighbourhoods. Not having a job or having experienced a decrease in mean hours per week spent at work was significantly associated with a larger increase in mean hours per week spent using drugs. An increase in mean hours per week spent looking for work was associated with a larger increase in mean hours per week spent using drugs. Although there is considerable risk of recall bias, the relevance of this study for testing the non-working time mechanism is high. The second study was performed among working-age African Americans from Milwaukee (20–56 years) and found that working part-time was associated with a higher likelihood of cocaine use in unadjusted analyses (Weston et al., 2009). In multivariate analyses, this association was no longer significant.

Social exclusion mechanism (counter-cyclical)

Studies with data from during a recession

The social exclusion mechanism was examined in two studies that were performed during an economic recession. A qualitative study among young adults leaving chemical dependency treatment in Minnesota during the 2007–2009 recession reported that respondents perceived that having a job provided sober peer

networks, healthy social contacts, and positive social relationships (Uggen & Shannon, 2014). In a longitudinal study among young adults from France during the 2008–2009 recession, social support was not associated with cannabis use and abuse (Melchior et al., 2015).

Studies with data not from during a recession

Three studies examined the social exclusion mechanism with data from studies about unemployment. Two qualitative studies found support for the fact that unemployment led to social exclusion (Hammarström, 1994; Tomori et al., 2014). Male injecting drug users who were released from detoxification centers in Vietnam reported that unemployment led to social exclusion, because it limited their ability to engage in a wider network of social interactions beyond their families (Tomori et al., 2014). Final-year Swedish female students reported that unemployment led to passivity, not wanting to go out, and isolation (Hammarström, 1994). This study did not report on a relation between social exclusion and drug use, but only on the relation between unemployment and drug use.

The qualitative study from Vietnam reported that social exclusion and stigmatization prompted episodes of drug use relapse or exacerbated struggles with drug addiction (Tomori et al., 2014). Social isolation sometimes triggered men to meet old drug user friends, which offered support from social isolation but also prompted relapse. A longitudinal study among young people aged 17–20 years from Norway showed that less social integration was associated with a higher likelihood of cannabis use at follow-up (Hammer & Vaglum, 1990).

Discussion

Based on the results of 28 empirical studies published between 1990 and 2015 we examined five individual-level mechanisms that explain how economic recessions and unemployment may affect use of illegal drugs among adults. The two mechanisms that were examined in most studies were the counter-cyclical psychological distress mechanism (17 studies) and the pro-cyclical income mechanism (10 studies).

Supportive evidence was found for the mechanism that hypothesized that recessions and unemployment increase psychological stress, which, in turn, increases illegal drug use. The findings from studies that were coded as high quality and high relevance and that examined the entire mechanism from unemployment through psychological stress to drug use all supported the hypothesized counter-cyclical psychological distress mechanism. Other studies found supportive evidence for the mechanism or non-significant results. Supportive evidence was found in a diverse set of countries (the United States, Australia, New Zealand, Norway, Sweden, Argentina, Vietnam, and Jamaica) and a diverse set of samples (e.g. drug users, young people, and the general population).

Overall, no supportive evidence was found for the pro-cyclical mechanism that recessions and unemployment decrease illegal drug use by decreasing income. Most studies did not find an association between income and drug use and some studies found results that contradicted the hypothesized mechanism. One study among the adult population from Southeast Michigan found mixed evidence (Kalousova & Burgard, 2014). Lower household income was associated with a higher likelihood of initiating marijuana, while a decrease in economic resources was associated with a lower likelihood of initiating marijuana (but only in the multivariate analysis). Two studies among people living in Argentine shantytowns found evidence for the income mechanism causing a change in the type of drugs people use, e.g. switching to cheaper pills instead of keep using expensive cocaine (Epele, 2010, 2011). Although no other empirical studies examined switching behavior among drug users, drug experts tend to agree that economic recessions could lead to switching behavior to cheaper drugs instead of 'classic' drugs that deteriorate in quality during a recession (Trautmann, 2013). Especially problem or dependent users may be expected to look for cheaper drug alternatives, and users may also shift to cheaper legal alternatives including alcohol or a mix of illegal drugs and alcohol. It is also possible that some drug users switch to injection of drugs to maximize the psychoactive impact (Lakhdar & Bastianic, 2011), which is a riskier administration method due to the risk of contamination with blood-borne diseases (Hagan, 1998). Because of these risks and the potential for higher rates of switching to injection among vulnerable populations, such as those with a low socioeconomic status (Lakhdar & Bastianic, 2011), it is important to examine switching behavior more closely in future studies.

Little evidence was available on the non-working time mechanism (4 studies) and the social exclusion mechanism (5 studies). Only one study of high quality and high relevance was identified for each mechanism. Most of the studies that did examine these mechanisms appeared to support the hypothesized associations. Recessions and unemployment were hypothesized to increase non-working time and social exclusion, which would in turn increase drug use. The job chances mechanism was not examined in any of the studies. It should be noted that the lack of evidence on these mechanisms does not necessarily mean that they are less relevant, they may just be studied less often. Alternatively, there could be publication bias in favor of the psychological distress and income mechanism, which may be the most intuitive mechanisms for most people.

The supportive evidence for the psychological distress mechanism was not challenged by any evidence of the opposite effect, e.g. that reduced income decreased drug use. In addition, we found some preliminary evidence that increased non-working time and increased social exclusion may also increase drug use. Thus, on this balance of evidence, we would generally expect drug use to increase during a recession. Studies that describe changes in substance use after the start of a recession mostly found increases or no changes in drug use (Colell et al., 2015; Lakhdar & Bastianic, 2011; Rossi et al., 2011). Additionally, studies that describe the relationship between unemployment and drug use mostly found positive or no associations (Arkes, 2011; Atkinson et al., 2003; Chalmers & Ritter, 2011; Colell et al., 2015; Compton, Gfroerer, Conway, & Finger, 2014; Kalousova & Burgard, 2014). The fact that sometimes no changes in drug use were found could possibly be explained by switching behavior.

We did not only aim to examine the mechanisms that explain how economic recessions and unemployment influence illegal drug use, but also wanted to identify in which individual-level and country-level contexts and for which types of drugs these mechanisms occurred. Unfortunately, subgroup differences were not reported in most of the studies and no clear patterns emerged of findings for different countries or for different subgroups. Similarly, studies often did not distinguish between different drug use outcomes. This made it impossible to draw separate conclusions about whether recessions and unemployment lead to changes in drug use experimentation, occasional use, or problem use and whether effects differ for different types of illegal drugs.

It is important to note that the mechanisms in our theoretical framework all assume that unemployment leads to substance use through mediating factors. However, reverse causality is also plausible (Lee et al., 2015). Psychological stress may not only lead to drug use, but drug use could also lead to psychological stress (Atkinson et al., 2003; Brunswick et al., 1992) and to unemployment (Atkinson et al., 2003; Uggen & Shannon, 2014). Some of the

positive associations that were found in cross-sectional studies and that we treated as supportive of our hypothesized mechanisms may actually be evidence of a different order of events or a mutually reinforcing relationship. A previous review on economic decline and health (Catalano et al., 2011) used a stricter approach than we did and excluded all studies based on cross-sectional associations. Although we did give more weight to longitudinal studies in our review (by taking the design into account in the quality assessment), we did not dismiss all cross-sectional evidence, as is in line with the realist review method (Pawson et al., 2005). There were seven quantitative longitudinal studies that examined the psychological distress mechanism. Five of these studies found results that were in line with the psychological distress mechanism (Calcaterra et al., 2014; Fergusson et al., 2014; Hammarström, 1994; Hammer & Vaglum, 1990; Winter et al., 2015). Two studies did not find significant evidence for the hypothesized mechanism but instead found evidence of depressive symptoms and mental disability at baseline being associated with unemployment at follow-up (Baggio et al., 2015) and drug use at baseline being associated with higher psychological distress at follow-up (Atkinson et al., 2003). There thus remains a need for more longitudinal studies that examine the psychological distress mechanism while also testing for reverse causality.

Recently, another systematic realist literature review examined how economic recessions affect alcohol use (De Goeij et al., 2015). The review found that alcohol use increases during recessions due to psychological stress, which was observed mainly in men. A second finding was that the volume of alcohol consumption and the number of drinks decreased during recessions due to lower individual incomes, which was found in all population subgroups across all studied countries, but the income mechanism did not change heavy and problematic drinking (De Goeij et al., 2015). The fact that we did not similarly find evidence that reduced income decreased illegal drug use may be explained by the difference in legality between the two substances. People who already engage in illegal activities when they buy illegal drugs, may feel less inhibited about using unlawful means (e.g. stealing money or selling drugs) to maintain use. However, most alcohol users may balk at resorting to illegal activities and so merely reduce use. For heavy and problematic alcohol use and for illegal drug use, we essentially found the same thing: reduced income does not reduce use. This implies that the higher addictiveness of some types of illegal drugs may also play a role.

Limitations

There were both limitations at the level of the primary studies that we used in this review and at the level of the realist synthesis that we performed.

The main limitation of the primary studies on economic recessions, unemployment, and illegal drug use is that individual-level mechanisms are often not studied. We identified only 28 studies that we could use for our review and only two of the five mechanisms from our theoretical framework were examined with sufficient evidence. Additionally, three quarters of the studies that we included examined only one mechanism. Therefore, the primary studies could not account for other mechanisms that may have been important. It is possible that results that were found for one mechanism could have been partly explained by another mechanism that was not studied. Another limitation of the primary studies is that most of them examined the influence of unemployment without examining the influence of economic recessions on employed individuals. Economic recessions may not only influence individuals by causing them to lose their jobs, but also by causing anxiety among people who fear that they will lose their jobs, causing distress among partners and children of those who lost their job, dissatisfaction among employees who get fewer hours or different tasks, lower incomes for pensioners, better behavior among people who want to increase their chances of retaining their job, et cetera (Catalano et al., 2011; Dooley & Catalano, 1984).

A limitation of our realist synthesis is that we limited our analyses to individual-level mechanisms while there can also be relevant mechanisms at the population-level. For example, prices and availability of illegal drugs may change during an economic recession (Dubanowicz & Lemmens, 2015; Bretteville-Jensen, 2011). In our review, we have treated these population-level mechanisms as contexts for individual-level mechanisms. However, a systematic literature review of evidence for these population-level mechanisms may increase our understanding of how recessions affect illegal drug use. Another limitation is that we only included studies that examined a recession or unemployment, one of our mediators, and use of illegal drugs. Much more literature is available that examines recessions or unemployment and one of our mediators without examining drug use, and literature that examines one of our mediators and drug use without examining recessions or unemployment. We also excluded studies in which respondents were institutionalized, hospitalized, or in treatment. We have chosen not to include these studies because of the importance of using evidence from similar contexts in realist reviewing (Pawson et al., 2005; Pawson, 2006). Also, we have not taken alcohol use into account in our search nor in our analyses although the relationship between unemployment and illegal drug use may be confounded by alcohol use. Finally, for practical purposes, we included only English language journal articles from six publication databases while realist reviews often include grey literature, multiple iterative searches, and snowballing procedures (e.g. O'Campo et al., 2015; Pearson et al., 2015; Yen, Flood, Thompson, Anderson, & Wong, 2014). Therefore, we may have missed relevant evidence for testing our theoretical framework.

Implications

The fact that recessions and unemployment can increase psychological stress is already well known (Catalano et al., 2011; Lin, Shah, & Svoboda, 1995; Uutela, 2010; Van Hal, 2015; Zivin et al., 2011). In our literature review we have shown that some people may try to cope with this stress by using (more) illegal drugs. The most important implication of our findings is that during times of recession, psychological support for those who lost their job and are vulnerable to drug use (relapse) is likely to be important. Reimbursement for professional psychological support, special counselors who provide support to those who lost their job, and mental health awareness campaigns are possible interventions that may help to prevent an increase in illegal drug use during an economic recession.

Conclusion

Our systematic realist literature review found mainly supportive evidence for the mechanism that hypothesized that economic recessions and unemployment increase psychological stress, which increases illegal drug use. The evidence base related to a diversity of countries and samples (e.g. among drug users, young people, and general population samples). We also identified evidence to suggest that non-working time and social exclusion mechanisms may similarly be associated with increased drug use. We found no support for the mechanism whereby reduced incomes lead to decreasing drug use. This balance of evidence leads us to expect drug use to increase during times of economic austerity such as during a recession.

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Contributors

GEN performed the literature search, coded the literature, and drafted the manuscript. She is the guarantor of the paper. KH assisted in coding the literature. All authors contributed to the design of the study. All authors revised the manuscript critically for important intellectual content and read and approved the final manuscript.

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Professor Kaner is a senior scientist in the NIHR School of Primary Care Research and NIHR School of Public Health Research, the latter as part of Fuse which is a UKCRC Centre of Excellence in Translational Public Health Research.

Conflicts of interest

None.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.drugpo.2017.03.013.

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Focus NHI

No budget for NHI without price tag – Finance Minister



Photo: iStock

February 26, 2025

Finance Minister Enoch Godongwana has thrown the ball into the Health Minister's court, saying if he wants money for the implementation of **National Health Insurance** (NHI), then he needs to come up with a figure.

Unless a price tag has been attached to the NHI, he can't budget for it, Godongwana said.

While Godongwana was unable to table his budget over a Value-Added Tax (VAT) proposal impasse with Government of National Unity (GNU) partners last week, he told the media there needs to be considerable improvement of health facilities before a national health insurance can be introduced.

EWN reports that conflicting reports emerging from Cabinet before the State of the Nation Address on how NHI implementation would be accommodated in the Medium-Term Development Plan (MTDP).

Godongwana has said estimated costs to date have all been based on guesswork.

"Minister (Aaron) Motsoaledi must submit a document to government saying how he plans to roll out the implementation ... so that all of us can be able to engage with it and understand the full cost ... over what period."

He said "several" health facilities currently don't meet the threshold of what's required for universal healthcare, and the untabled Budget proposes a costing exercise to build more hospitals.

"The infrastructure has to be upgraded, substantially, for hospitals to be able to be compliant with the NHI – that's where we are in terms of the costs."

The proposed budget aims to fast-track upgrades by increasing the number of bid windows from one to four.

Godongwana was also going to announce that R29bn of this money would be used to keep more than 9 000 healthcare workers in hospitals, allow for the employment of 800 post-community service doctors, and keep pharmacies stocked.

Meanwhile, Motsoaledi has "wasted" R28m of taxpayers' money on advertising the NHI Act, the DA has fumed, calling the R3m spent every month since April last year "a vanity project".

Motsoaledi had revealed the figure in a written reply to a parliamentary question, reports ***The Citizen***.

But party spokesperson on Health Michele Clarke described the campaign as propaganda meant to force the implementation of the Act, despite concerns from some members of the (GNU), and called for an end to the campaign.

The money, she added, could have been spent on hiring more doctors and nurses.

"The Minister claims there are no funds to fill the 2 000 vacant medical positions in public hospitals... thousands of qualified doctors and healthcare professionals are unemployed or underemployed.

"It is unconceivable that this government, which cannot provide basic healthcare services to its people, chooses to splurge millions on advertisements that promote an unrealistic, unimplementable healthcare scheme."

The Minister also noted that the R77.8m allocated in 2019/20 for NHI advertising through the tainted Digital Vibes company was repurposed in 2022 for Covid-19 communication. "This sum is the matter of investigation by the Special Investigation Unit (SIU)," he added.

According to the SIU, Digital Vibes was appointed in 2019 to perform NHI communication services. This was extended to cover Covid-19 communications. Altogether the department allocated about R150m to the company in what the SIU found were irregular procurement processes.

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'Necessary'

Asked whether R28.5m was perhaps an excessive amount, Health Department spokesperson Foster Mohale said it was not, given what was very expensive television advertising. It was necessary to have a broad reach of advertising using a variety of platforms to reach as many people as possible, he added.

Business Day also asked Mohale why it was necessary to promote NHI: "NHI is the policy of government. Just like other policies of government we have to raise awareness. We have to make people aware of the benefits and the intended benefits of this policy."

"The billboards that decorate our highways, social media and other advertising celebrating the NHI are a slap in the face to every SA taxpayer who is already shouldering the burden of a failing healthcare system," responded Clarke.

EWN article – Godongwana says Motsoaledi must submit NHI rollout plan to be considered in the budget (Open access)

BusinessLIVE – Health department spends nearly R30m on NHI advertising

The Citizen – Health minister slammed for exorbitant spending on NHI advertising while doctors and nurses are unemployed

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No plans yet for NHI funding through taxes – Treasury

Motsoaledi must come clean on NHI funding

IRR: Government must tell us what the NHI will cost and where money will come from

Reprieve for medical aids with NHI 'breakthrough'?

RVL W.M

81/172488(Z19E)

NOTICE

BY THE

PRESIDENT OF THE REPUBLIC OF SOUTH AFRICA

No. 1088 **22 December 2011**

NATIONAL EXECUTIVE INTERVENTION IN LIMPOPO PROVINCE IN TERMS OF SECTION 100 (b) OF THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996

The National Executive, at its meeting on 5 December 2011, decided that some Ministers in national government, will assume responsibility for relevant functions of the Provincial Executive of the Limpopo Province, in terms of section 100 (1)(b) of the Constitution with effect from 12 December 2011. These are as follows;

1 Minister of Finance assumes responsibility for the Provincial Treasury;
2 Minister of Health assumes responsibility for the provincial Department of Health and Social Development;
3 Minister of Transport assumes responsibility for the provincial Department of Roads and Transport;
4 Minister of Basic Education assumes responsibility for the provincial Department of Education; and
5 Minister of Public Works assumes responsibility for the provincial Department of Public Works.

This intervention is effective from the date of implementation thereof, and shall remain effective until terminated by the national executive or in terms of section 100(2)*(b)* of the Constitution, whichever comes first.

The Minister of Finance has been asked to coordinate a team of Ministers to oversee and monitor implementation of the National Executive's decision.

The Province remains responsible for the funding of the Provincial Departments referred to above during the period of this intervention.

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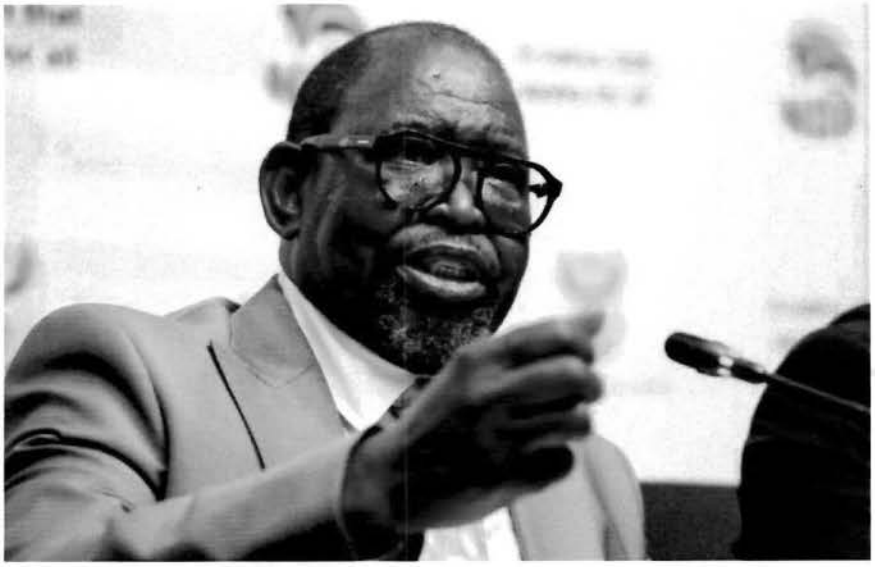
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'Attack on the middle class': Godongwana blasts plan to kill medical-aid tax credits

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Finance Minister Enoch Godongwana launched a stinging attack on a plan from the department of health to phase out medical-aid tax credits, calling it "an attack on the middle class".

Earlier this month, Nicholas Crisp, the deputy director-general for health responsible for the National Health Insurance (NHI), presented the department's funding plan for a phased transition to the NHI over 15 years. This included the phased removal of tax credits, beginning with the wealthiest third of medical-aid members.

But during a media briefing ahead of tabling the Medium-Term Budget Policy Statement (MTBPS), Godongwana distanced himself from the plan.

He said he was worried about removing the tax credits from the "same group" of people who are funding the bulk of personal income tax.

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Godongwana said it would be an "attack on the middle class", if the credits were removed without presenting an alternative.

On Wednesday, a Treasury official confirmed the medium-term budget, which details the government's plans for the next three years, does not include the proposal to phase out medical-scheme tax credits. The credits are included in planning, with inflationary increases each year.

There were no inflation adjustments to medical tax credits in this year's Budget, which remained at R364 a month for the first two beneficiaries and at R246 a month for the rest.

There was also no mention of the NHI in the 100-page medium-term budget document, although grant allocations to the NHI – mostly to fund health infrastructure – form part of the Budget.

The Board of Healthcare Funders, which represents more than 40 medical schemes and administrators, previously warned that phasing out the credits completely could make scheme membership unaffordable for between 430 000 and 690 000 members.

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Department of Health accused of shirking its duty to blacklist corrupt companies

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The Health Department says it is the Treasury's responsibility to blacklist the companies involved in R2 billion worth of corruption at Tembisa Hospital.

Image: Dimpho Maja/African News Agency(ANA)

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The controversy escalated when Health Minister Aaron Motsoaledi revealed that the department had called on the Special Investigating Unit (SIU) to begin the process of blacklisting the 207 service providers implicated in the scandal. These companies reportedly executed trades under at least 4,501 purchase orders, many of which were flagged as irregular.

In a response to written questions from ActionSA MP Alan Beesley, Motsoaledi contended that the responsibility to blacklist these service providers ultimately lies with the National Treasury. However, Beesley countered that blacklisting should involve collective action from accounting officers, such as the CEO of Tembisa Hospital and the head of the Gauteng Health Department, as well as the Presidency.

Sandile Swana, a governance expert and political analyst, weighed in on the matter, suggesting that the health ministry's reliance on external bodies highlights a worrying trend: "The culture of blacklisting does not exist in South Africa," he stated. Swana believes that Motsoaledi's decision to shift responsibility serves as a means to deflect blame from potential political fallouts linked to criminal activities.

"This reinforces that accountability is missing from the culture of governance," he added. Although the law stipulates that accounting officers must report intentions to blacklist non-compliant companies, they also need compelling evidence to proceed, which has further complicated the process.

While National Health spokesperson Foster Mohale insisted that only the Treasury possesses the authority to blacklist non-compliant service providers, he acknowledged the necessity for thorough investigations prior to any such action. Following the whistleblowing by Babita Deokaran, who was assassinated in August 2021 after exposing the corrupt practices at Tembisa Hospital, Mohale stated that the Gauteng Department of Health has submitted a list of companies for blacklisting to the Provincial Treasury.

Deokaran's investigation revealed alarming irregularities that, until the SIU's findings, suggested only R850 million had been misappropriated at the hospital. The current estimate surpasses R2 billion, as the SIU uncovered extensive manipulation of procurement processes designed to bypass regulatory scrutiny.

The investigative report unveiled tactics such as avoiding tender processes, falsifying documents, and strategically keeping purchase orders below R500,000 — enabling crooked service providers to evade more stringent oversight.

The Public Servants Association (PSA) expressed outrage at the government's failure to blacklist the implicated firms, deeming it a "shocking lapse in accountability". It argued that the ongoing bureaucratic wrangling between the Health Department and the National Treasury has prevented decisive action and exacerbated public distrust.

Professor Andre Duvenhage, a political analyst from North-West University, condemned the absence of early involvement from law enforcement agencies, particularly given the serious implications tied to Deokaran's murder. He underscored the need for political will to effect change and to hold accountable those who exploit frameworks meant for better governance.

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