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Current pesticide suicide surveillance methods used across the African continent: a scoping review protocol

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ABSTRACT

Introduction Every year, more than 800 000 people die from suicides of which an estimated 20% are from pesticide ingestion. Multiple studies have estimated that around 77%–80% of these pesticide suicides occur in low/middle-income countries. The full burden of pesticide suicides in African countries remains poorly documented, one reason being the lack of systematic data collection. It is essential to know the number of pesticide suicide cases to guide prevention of further cases occurring. This can be done by informing policy and legislation, and the implementation of targeted bans, as well as raising community awareness around the use of these pesticides, training of healthcare personnel, and influencing the type and level of clinical facility investments into this area of healthcare. The scoping review aims to investigate how pesticide suicide deaths in Africa are recorded by exploring the various surveillance systems in place, as well as highlighting key limitations and data collection barriers.

Methods and analysis A scoping review will be carried out with the five-stage methodological frameworks set out by Arksey and O'Malley and the Joanna Briggs Institute. Studies in English that looked at pesticide suicide in African countries will be extracted and screened independently by two reviewers against the inclusion and exclusion criteria of this review. Studies' data will be extracted, and a descriptive synthesis developed of their main findings, as guided by the approach of Levac and colleagues.

Ethics and dissemination Ethics approval is not required for this review as no human participants will be involved. The study findings will be distributed in a peer-reviewed publication.

Registration details This protocol has been submitted for publication to *BMJ Open*.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ As far as we are aware of, this scoping review will be the first to document and provide an analysis of the pesticide suicide surveillance methods used across the African continent.
⇒ This protocol outlines the methodological rigour of this scoping review by abiding by the frameworks of Arksey and O'Malley, the Joanna Briggs Institute, and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews checklist to ensure methodological rigour.
⇒ A limitation is that only English-language studies will be included in the review.

INTRODUCTION

Pesticide suicide is a major health problem globally. Every year, more than 800 000 people die from suicides of which an estimated 20% are from pesticide ingestion.[1] Multiple studies have estimated that around 77%–80% of these pesticide suicides occur in low/middle-income countries (LMICs).[2 3] In 2010, deliberate pesticide ingestion as a means of suicide was estimated to account for between 250 000 and 370 000 000 deaths every year.[4] A systematic review of fatal self-poisoning with pesticides showed that an estimated 168 000 pesticide suicides occurred annually in the world between the years of 2006 and 2015.[5] It has been seen that within rural communities of predominantly LMICs, pesticide suicides and acute pesticide poisonings are common.[4 6] This could be due to the wide availability, easy access and extensive use of highly toxic pesticides within rural agricultural-producing communities.[4] Therefore, should this accessibility to pesticides continue, it is possible that pesticide ingestion may become an even more frequent method of suicide. However, the full burden of pesticide suicides in African countries still remains poorly documented for several reasons.[2 7] One reason is the lack of systematic data collection, especially since less than 10% of the countries in Africa report mortality data to the WHO.[8] Lack of human resources and institutional capacity, as well as political and economic struggles in some countries, contributes to poor and disrupted data collection systems. Stigma, both societal and religious, associated with suicide and criminalisation of attempted suicide in several countries of the region may be another reason for gaps in suicide reporting.[9]

Pesticide poisoning and pesticide suicide reporting and data

Pesticide suicide reporting appears to follow two main pathways. One pathway involves the use of the health system where specific inpatient and outpatient facilities, such as hospitals, report pesticide poisonings, deaths and suicides; while the other pathway involves police system reporting, including mortuary data, and is often used if death occurred outside of hospitals.[10–12] Within the healthcare systems, there is sometimes also the option of a Poison Information Centre. This is either based in a hospital or operated as a call centre through which such cases can be reported.[10–12] Both reporting pathways need to be considered to present a comprehensive picture of the situation.

Available data on pesticide suicides in Africa are mostly based on small studies conducted among different populations with diverse economic, social and cultural backgrounds. According to the WHO, Africa is the only region that experienced an increase in suicide rates between 2000 and 2012, where there was an estimated 38% increase in the rate.[2] Gunnell and colleagues in 2007 had estimated that 15%–33% (n=7800 deaths) of suicides on the continent were pesticide self-poisoning.[7] This estimate was, however, based on four studies carried out in urban settings in Nigeria, Malawi, Tanzania and South Africa, which all made use of verbal autopsy data.[7]

In contrast to the study done by Gunnell and colleagues, a systematic review on the global burden of pesticide suicides conducted by Mew and colleagues[5] estimated that only 3.5% (n=2100) of the suicide deaths in Africa were pesticide suicides.[5] This was based on the WHO's mortality data and information from literature published in a number of relevant databases between 2006 and 2015. It is important to note that this study highlighted that the limited amount of data available for the African continent may have resulted in an underestimation of the pesticide suicide rate, due to the data source used, and that the rate was more likely to coincide with that of the Gunnell and colleagues' study.[5 7]

Finally, another systematic review, performed in 2014 by Mars and colleagues using data from 1998 to 2013, concluded that pesticide poisoning was one of the two most frequently used methods of suicide among countries that had suicide incidence available on the African continent, with the other most frequent method being hanging.[8] The differences in estimations between these studies further point to the challenges of pesticide suicide surveillance on the African continent and highlight the need for a standardised method of surveillance as well as sufficient surveillance capacity and an expansion of the coverage of surveillance methods.

There is a significant lack of primary data on the pesticide suicides in countries of the African continent. Currently, the available data are limited and based on a few hospital-based studies in Tanzania, Zimbabwe, Uganda, Malawi and South Africa. A Tanzanian hospital-based retrospective study from 2000 to 2005 reports that majority (64.4%) of the acute pesticide poisoning cases (n=656) were suicides, and in 2006, a prospective study reported 84.6% (n=230) in the same hospital.[13] Another Tanzanian study in Muhimbili University Hospital in 2004 revealed that 24% (n=24) of the suicides were due to pesticides.[14] Other available primary data on pesticide poisoning and pesticide suicides in Africa are from other hospital-based studies, not covered by the Mew and colleagues' study.[5 15] A study done between 1998 and 1999 in eight urban referral hospitals in Zimbabwe showed pesticides were responsible for nearly 60% (70 out of 123) of all the poisoning deaths, and 41% (1142 out of 2764) of the poisoning cases were deliberate self-poisoning suicide attempts.[16] In Kampala, Uganda, out of the 100 patients admitted to three major urban hospitals in 2002 following deliberate self-harm, 40% were pesticide suicides.[17] An additional study done that looked at hospital records from both urban and rural settings in Uganda from January 2010 to August 2016 found that, in the urban setting, 63.3% of the 212 pesticide poisoning cases were deliberate self-harm.[18] In the rural setting, 25% of the 101 pesticide poisoning cases were deliberate self-harm.[18]

A retrospective study in Blantyre, Malawi from 2000 to 2003, based on mortuary records from the urban-based Queen Elizabeth Central Hospital and College of Medicine, revealed that pesticides were the mode for 79% (66 out of 84) of the suicides.[19] A study done at a tertiary hospital in an urban setting in South Africa found that ingestion or inhalation of pesticides occurred in 19 of the 238 deliberate self-harm cases over a 9-month period, from June 2014 to March 2015.[20] This study indicated that pesticide poisoning is not as common in urban settings in South Africa.[20] An additional study in South Africa that made use of census data and the Department of Home Affairs records, which capture information on births and deaths in South Africa, between the years of 1991 and 2016, found that of the 8573 suicides recording throughout that time period, 1.7% were categorised as pesticide poisoning suicides.[21]

Deaths from pesticide poisoning are believed to be more common in rural areas where there is limited access to healthcare services and where highly hazardous pesticides are widely used and accessible.[18 22 23] However, several factors complicate this assumption. First, poisoned patients are frequently transferred from rural to urban hospitals for advanced care and intensive care unit beds.[18] Urban, particularly poor, households have been shown to illegally use agricultural pesticides as a rodenticides and household insecticides (ie, street pesticides) and also for suicides.[24–26] Urban settings, may therefore, not be entirely representative of pesticide suicide deaths, but they cannot be excluded. Ideally, a sufficient surveillance system would include data collection from both rural and urban settings, regardless of resource availability, providing a more complete picture of pesticide suicides.

From these studies, while pesticide suicide may not be the most common method of suicide in all settings, it remains a problem on a larger scale of country context

in many African countries. Furthermore, fewer pesticide suicides officially recorded do not necessarily mean fewer pesticide suicides but could suggest that the reporting systems used in these studies may not be capturing the true number of pesticide suicides in these countries.

Under-reporting of pesticide suicides on the African continent could be a direct result of non-availability of an established surveillance system to capture the pesticide suicides. Improved pesticide surveillance system in South Africa has shown to capture cases of acute unintentional and severe poisoning 10 times more than the routine notification system.[27] This indicates that a general trend towards under-reporting of poisoning cases, be it intentional or not, currently exists in Africa and the potential impact on decision-making if surveillance is improved.

Pesticide poisoning and pesticide suicide surveillance

Surveillance is defined as ongoing systematic collection, analysis and interpretation of data essential for planning, implementation and evaluation of public health practice.[28] Pesticide poisoning and pesticide suicide surveillance is a vital tool for decision-makers and regulators of pesticides to manage the inherent risks associated with and easy access to pesticide use for agriculture and public health. However, in comparison with other diseases, pesticide poisoning, in general, is a complex condition for surveillance, mainly because it includes several clinical presentations depending on the type of pesticide used, duration of exposure to the pesticide as well as the circumstances under which the exposure occurred. Pesticide poisoning (eg, from organophosphates) is often misdiagnosed (some symptoms are confused as the influenza, for example), and health professionals receive limited training on the wide range of pesticide classes and their related acute and chronic health effects. In addition, a successful pesticide poisoning surveillance system demands triangulated data from multiple sources, including from health institutions and departments, agricultural departments and industries. Data from healthcare institutions, toxicology analytical laboratories, forensic laboratories, police or crime bureaus are further needed for filling in the data gap on pesticide poisonings and suicides. Pesticide suicide surveillance is equally as challenging and presents the same complexities as pesticide poisonings, however, there is an added layer of challenges when considering the legal and social circumstances that may surround suicide (eg, criminalisation of attempted suicide in the law, cultural, religious and social taboos). What is required is an understanding of how pesticide suicide surveillance could be improved or implemented with existing general surveillance systems in Africa.

Currently, an existing surveillance structure, which could be used as a potential data source, are national Poison Information Centres (PICs). These centres provide information on all types of poisoning and are helpful for clinicians and the public as a source of time-bound information and advice for poisoning cases, as well as collect data around these cases.[29] Currently, PICs are limited in Africa. There are approximately 12 PICs (ie, Algeria—2; Angola; Ghana; Kenya—2; Senegal; South Africa—3; Tanzania and Zimbabwe). Of those that exist, many are under-resourced.[30 31] These PICs would need to be linked to a national systematic recording system to be fully effective and efficient in monitoring and collecting data on pesticide poisoning linked to suicides.

National Health Management Information Systems (HMIS) data are another potential source for pesticide poisoning and suicide information that could be used for monitoring and policymaking. These systems collect routine quantitative data in the healthcare system, such as deaths and cause of death, that can be used to identify areas of healthcare and reporting that can be improved on in a cost-effective manner.[32 33] An HMIS focused on pesticide suicides would require diligent investigations into suspected pesticide suicides, followed by capturing of any necessary information surrounding the death including the type of pesticide used, the active ingredient or co-formulant that caused the death and the circumstances of the death. In countries where registration is not well established, verbal autopsy data are an alternative, in which an immediate family member or a caretaker is interviewed to identify the conditions and wider circumstances prior to death and thereby establish a cause of death. District Health Information Software 2 (DHIS2) is an example of a successful digital HMIS that has been adopted by 67 countries.[34] DHIS2 involves the use of a software platform established for collection, management, analysis and use of health data collected by health professionals in these countries.[34]

In South Africa, an additional source of data is the National Injury and Mortality Surveillance System.[35] This is a surveillance system that was established in 1999 and collates information from mortuary investigations and services, as well as state forensic laboratory records.[35] This type of data is suitable for capturing poisoning-related deaths and would easily identify pesticide poisoning cases. In some cases, however, laboratories may not be able to identify some types of pesticides due to a lack of available sample standards or existing data on pesticides, making it difficult to identify some pesticide poisoning cases.

While hospital records and data capturing systems are useful in pesticide suicide surveillance, any deaths that occur outside of a hospital may be missed. It is therefore important to also consider police reporting of deaths as an important step in the surveillance pathway.[11] Suicides reported to the police could be further investigated and suspected pesticide suicides reported and documented for surveillance purposes. This would indicate the burden of pesticide suicides outside of the healthcare system.

Existing surveillance systems for pesticide poisonings and suicides on the African continent vary depending on the context, resources and availability of information surrounding such cases. It is important to investigate these existing systems to get an overall picture of the current pesticide suicide and poisoning surveillance in Africa, and where this could be improved or adjusted.

RATIONALE

Pesticide suicides in Asian and South American countries are known to be significant, with an estimated 160 000 pesticide suicides a year in South East Asia and 8000 in Central and South America, according to a systematic review conducted in 2007 and the more recent study in 2017.[7 36] A study conducted in a rural community in China found that 80.5% of the 297 suicide attempts were done via pesticide ingestion,[6] while a study in India between 1993 and 2003 found that 92 000 suicides were committed using pesticides.[12] In contrast, the status of pesticide suicide on the African continent is hardly reported. Meanwhile, pesticide imports and sales are on the rise. In Tanzania, pesticide imports showed a fivefold increase from 500 tons in 2000 to 2500 tons in 2003, and the number of registered pesticides had risen from 682 to 874 over a 5-year period starting from 2006.[37] In Ethiopia, the registered number of pesticides has increased from 226 in 2013 to 326 by 2016 and additional 16 companies have begun importing pesticides for the same period.[37] There has been a 47% increase in the pesticide imports in Uganda during 1980–2004, this is in addition to the unknown quantities that were smuggled through non-secured borders.[37]

All this is amidst the escalating rates of pesticide sales in the African region and agriculture transition to cash crops,[38] supporting high utilisation, and hence the availability of pesticides in farming communities. Rising trends in pesticide usage is not limited to the larger commercial farms and estates, but also penetrated to the smallholder farmers. Half of the vegetable smallholder farmers in northern Tanzania showed increased amounts of pesticide use in 2005 compared with preceding 5 years.[39] Despite the increases in utilisation, import and export of pesticides, low reporting levels of pesticide self-harm remain. Therefore, it is worthwhile to explore the causes underlying this low reporting of pesticide self-harm in the African continent. Is it due to low numbers in these countries or is it due to the existing surveillance systems not capturing such incidents? This review will explore these ideas further with a focus on the current pesticide suicide surveillance systems being used in Africa and whether they are sufficient or perhaps a hindrance to reporting.

Furthermore, it is essential to be aware of the prevalence of pesticide self-harm cases or attempted pesticide suicide, which do not end in death. This information will help in preventing further cases from occurring through informing policy and legislation, implementation of targeted bans on dangerous pesticides, raising community awareness around the use of pesticides, training of healthcare personnel, as well as influencing the type and level of clinical facility investments into this area of healthcare.

SCOPING REVIEW OBJECTIVES

In this scoping review, we aim to present a broad picture of how pesticide suicide deaths and attempted pesticide suicides in Africa by identifying and exploring the various surveillance systems in place, as well as highlighting key limitations and data collection barriers.

The following objectives will be studied to address the aim of this review:

1. To review the current literature on pesticide suicides and attempted suicides in Africa.
2. To determine which surveillance methods, including those of collecting, compiling, reporting and analysing, are currently being used to identify pesticide suicides and attempted suicides in Africa.

To achieve these objectives, this scoping review will address the following questions:

What current surveillance systems are in place in African countries to capture and record suicide by pesticides? What are the potential barriers or limitations to these existing surveillance systems?

METHODS AND ANALYSIS

The methods for this scoping review were designed in accordance with the five-stage methodological frameworks as set out by Arksey and O'Malley and the Joanna Briggs Institute (JBI).[40 41]

The scoping review will be reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews.[42] The anticipated start date of this review is 1 July 2022 and the anticipated end date is 30 September 2022.

Stage 1: identifying the research question

As recommended by JBI,[41] one way to structure a research question is to follow the PCC mnemonic for Population, Concept and Context, which was used to develop the review question. *Population* is defined as those who engage in self-poisoning with pesticides and populations that have cases of fatal and non-fatal pesticide poisoning. Since suicide is associated with significant stigma, not all suicides may be reported as suicide but instead reported as accidental pesticide poisoning. This is the reason why, in addition to pesticide suicides and attempted suicide, we included cases of non-occupational pesticide poisoning. *Concept* in this review refers to the varying reporting or surveillance methods, while *Context* is the African continent with various limitations as indicated in the inclusion criteria.

Patient and public involvement

As this is a scoping review, no patients will be directly involved.

Stage 2: identifying relevant studies

Information sources

This review will conduct searches in the following databases: MEDLINE (via PubMed), Scopus (which includes considerable Embase content), Web of Science Core Collection, Biological Abstracts, SciELO (on Web of Science platform), Academic Search Premier,

Table 1 Search strategy for PubMed (to be adapted to other databases)

Population: suicide and pesticide suicide search		
#1	MeSH term:	Suicide
#2	MeSH term:	Poisoning Poisoning[subheading]
#3	Text word:	Overdose OR parasuicide OR poisoning OR self-destruction OR self-destructive OR self-destructing OR self-harm OR self-injurious OR self-poison OR self-poisoning OR self-inflicted OR self-mutilation OR suicide
#4	#1 OR #2 OR #3	
Pesticide search:		
#5	MeSH terms:	Pesticides
#6	MeSH terms:	Pesticides [Pharmacological Action]
#7	Text word:	acaricides OR agricultural chemical OR agrochemical OR aluminium phosphide OR carbamate OR chemosterilant OR defoliant OR fungicide OR hazardous compounds OR hazardous substances OR herbicide OR Insect control OR Insect repellent OR insecticide OR miticide OR molluscacides OR organochlorine OR organophosphate OR organophosphorus OR paraquat OR pest control OR pesticide OR poisons OR rodent control OR rodenticide OR toxic substances OR toxins OR weedkiller
#8	#5 OR #6 OR #7	
#9	#4 AND #8	
Concept: Surveillance		Omitted filters for surveillance in order to keep search as broad as possible
Context: geographic filter		
#10	MeSH terms:	Africa
#11	Text word:	Africa OR African OR Algeria OR Angola OR Benin OR Botswana OR “Burkina Faso” OR Burundi OR “Cabo Verde” OR Cameroon OR Cameroun OR “Canary Islands” OR “Cape Verde” OR “Central African Republic” OR Chad OR Comoros OR Congo OR “Cote d'Ivoire” OR “Democratic Republic of Congo” OR Djibouti OR Egypt OR Eritrea OR eSwatini OR Ethiopia OR Gabon OR Gambia OR Ghana OR Guinea OR Guinea-Bissau OR “Ivory Coast” OR Jamahiriya OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Mayotte OR Morocco OR Mozambique OR Namibia OR Niger OR Nigeria OR Principe OR Reunion OR Rwanda OR “Saint Helena” OR “Sao Tome” OR Senegal OR Seychelles OR “Sierra Leone” OR Somalia OR “St Helena” OR Sudan OR Swaziland OR Tanzania OR Togo OR Tunisia OR Uganda OR “Western Sahara” OR Zaire OR Zambia OR Zimbabwe
#12	#10 OR #11	
#13	#9 AND #12	
Filter to human studies		
#14	MeSH	Animals NOT Humans
#15	#13 NOT #14	

Africa-Wide Information, Biological and Agricultural Index, CINAHL, Health Source Nursing/Academic, APA PsycInfo and General Science (EBSCOhost platform).

Grey literature will be sourced from the following databases: Database of African Theses and Dissertations, ProQuest Dissertations and Theses, WorldCat Dissertations and Theses, International Association for the Prevention of Suicide conference proceedings, African Index Medicus, Eastern Mediterranean Index Medicus, Global Index Medicus, OpenDoar, OpenGrey, CGIAR repositories and PapersFirst.

Finally, we will hand search the reference lists of included papers to identify further relevant articles not captured in the initial search and do forward citation tracking of reference lists using a citation index like Scopus, to identify further relevant papers.

Search

The search strategy, in table 1, was developed using terms for the Population (suicide and pesticide) and the Context (the African continent), while search filters for the Concept (surveillance) were omitted to ensure that relevant studies on data collection or reporting of pesticide suicides would not be missed.

Stage 3: study selection

Inclusion and exclusion criteria

The criteria for including and excluding studies in this scoping review are presented in table 2.

Selection of sources of evidence

Sources will be selected through a process of screening based on the eligibility criteria outlined in table 2. A reviewer will conduct the search on the databases, with assistance from a University of Cape Town librarian,

Table 2 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Articles in English only	Articles with no English translation
Articles that conducted research on the African continent	Studies outside the African continent
Peer-reviewed articles or articles from a specified grey literature database (listed above)	Articles not subject to a peer-review process
Articles on pesticide poisoning	Articles on poisoning using chemicals not classified as a pesticide
Articles on suicide	Articles on accidental pesticide poisoning
Articles on human studies	Animal studies
Articles that mention pesticide suicide surveillance systems	Articles that do not mention surveillance systems
Articles with data of any type (quantitative, qualitative or mixed)	
Official government records	
No limits on publication date	

extract the results and export them into EndNote and then into Rayyan after removing any duplicates. The PRISMA flow diagram (online supplemental data 1) will be used to keep track of the screening process. To determine the eligibility of each source for this study, two of the authors will independently conduct the title and abstract screening, or a similar kind of screening in the absence of an abstract. Any sources that could not be determined as eligible or not from the abstract will be subject to full-text review. Following this, each reviewer will perform a full-text review on studies included from the title and abstract screening. Using Rayyan, each reviewer will indicate the sources to be included and the ones to be excluded and the reasons for exclusion. Any disagreements between the reviewers will be discussed and if a mutual decision is not reached, a third author will resolve the conflict. The final resulting sources will then be used for the analysis of this review.

Stage 4: data extraction

Data charting process

Table 3 presents the extraction spreadsheet fields. It consists of categories used to assess the final eligible articles retrieved from the systematic search. This framework might change as reviewers chart the results of the articles. The framework will be updated continuously, as the reviewers increase their awareness of the content of the included studies. The same two reviewers will oversee charting the data independently. We ensure inter-rater reliability of the extraction fields by comparing a sample of the eligible articles, independently rated by the two reviewers, and discuss any discrepancy.

Table 3 Data extraction items

Category	Description
1. URL/source	URL address of the publication
2. Authors	Names and institutions
3. Title	As per the database
4. Year of publication	Month and year
5. Objective	Objective of the study
6. Study design	Cohort/cross-sectional/ecological, etc
7. Country/ies	Country/ies the study took place in
8. Setting	Urban or rural Area the study was based in Hospital based or community based
9. Type of data	Primary data collected for the study Secondary data from an existing source
10. Source of data	Eg, verbal autopsy, HMIS, census data, police records or data collected for the specific study
11. Study duration	Time period over which the study took place or observed
12. Study population	The population of the study
13. Sample size	Size of the sample in the study
14. Type of pesticide	The type (group) of pesticide used for self-harm or poisoning
15. Number of deaths from each pesticide	The number of deaths that were related to each pesticide identified in the study
16. Results	Number of deaths reported/period Location of the results from multiple sights
17. Conclusions	Conclusions drawn from the study
18. Timeliness of the data	Gap between the data origin and publication
19. Coverage of the data	Does it provide data on both pesticides and suicides?
20. Depth of data	Does it give information on the type of pesticide

HMIS, Health Management Information Systems.

Data items

The variables considered in this scoping review include the following:

- Number of suicides.
- Number of pesticide poisonings.
- Number of pesticide suicides.
- Number of poisonings.
- Number of deaths from pesticide poisonings.
- Type of pesticide.
- Number of deaths from each type of pesticide.
- Age of individuals in each study.
- Occupation of individuals.
- Setting of each study (eg, rural, urban, hospitals or clinics).
- Source of data (primary, secondary).

Critical appraisal of individual sources of evidence

As this is a scoping study, we will provide a descriptive synthesis of the main findings of included studies, guided

by the approach of Levac and colleagues[43] to demonstrate the current evidence for the different surveillance systems. Pesticide suicide rates for the African continent will be calculated based on each of the available surveillance system.

Stage 5: collating, summarising and reporting the results

Synthesis of results

Data will be summarised according to the country/location, number of pesticide suicides and the time period. Data will be also summarised based on the different surveillance systems and number of pesticide suicides reported captured by each surveillance system.

ETHICS AND DISSEMINATION

This study will review the current literature and explore the scope of pesticide suicide research in Africa. As there are no human participants in this study, ethics approval is not required. The outcome of the scoping review will also be written up as a journal article and published.

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Contributors MB and AK are co-first authors of this protocol and led the design and development of this study, drafting and finalising this protocol. LU, ME, FK and H-AR gave guidance to the study conceptualisation and protocol development. All authors provided input and commented on drafts, as well as approved the final manuscript.

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Competing interests LU and AK report grants from Open Philanthropy Project, during the conduct of the study.

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

Patient consent for publication Not required.

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