

Evaluation of the suicide registration system in Maputo and Matola, Mozambique, 2016-2018

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ABSTRACT

Introduction: Suicide is a major public health problem worldwide and a major cause of death in young adults. Mozambique had one the highest suicide rate in Africa with 23.2 suicides per 100 000 inhabitants. We aimed to evaluate the Suicide Registration System in the cities of Maputo and Matola (SRSMM) to have an overview of the system and to assess the suicide burden in the population. **Methods:** We extracted data from the “external cause” death registration system, available at the Legal Medicine Service at the Maputo Central Hospital (LMS/HCM) from 2016 to 2018. The evaluation was based on the updated CDC guidelines. **Results:** The SRSMM is a complex system with multiple data sources. It is a system with excellent data quality (96.2% complete), is representative (87.5% coverage) and is useful for identifying the cause of death. The system remained stable throughout the analysis period, except for 4 months in 2017, during which did not register deaths. From 2016 to 2018, 289 registered suicide cases were analyzed. A total of 219 (75.8%) were men aged 20-39. The most common suicide method was hanging, with 249 cases (86.2%). **Conclusion:** Though the SRSMM is a complex system, it has good data quality, is representative, and is useful for improving vital statistics and identifying risk groups. The findings of this evaluation demonstrate the need to add key variables on the system that can allow meaningful analysis on risk factors and interventions; and to expand the system nationally in order to have an overview of the severity of suicide.

KEYWORDS: Health Information Systems, Suicide, Public Health Surveillance, Mozambique

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Introduction

Suicide is a conscious act of self-annihilation, carried out by someone who is in a vulnerable situation and who perceives it as the best solution to get out of unbearable psychological pain [1]. It constitutes a major public health problem worldwide and is one of top causes of death in the population aged 15-34 years [2]. It is estimated that, globally, close to 800,000 people die due suicide per year [3,4], and the World Health Organization (WHO) recognizes suicide has a public health priority [5].

Several factors that leads to suicide have been persistently observed across countries and cultures. These factors include the presence of mental disorder, family history of psychopathology, depression, stressful life, traumatic events, young or old age, low socioeconomic status, and previous suicide attempts [6,7].

At the global level there are scarce data available and the quality of data on suicide and suicide attempts available is suboptimal. So far, there are no reliable data from most African countries to assess the magnitude of the problem of suicide. The problem of poor-quality data is not unique to suicide. Given the sensitivity and stigma surrounding suicide, it is likely that suicide and suicide attempts are underreported and misclassified at the health facility and community level [8].

Over 70 percent of suicides in the world are believed to occur in low and middle income countries (LMIC's)[5]. In 2012, a report for the WHO estimated Mozambique had a suicide rate of 27.4/100 000 inhabitants, ranking the country as having the highest prevalence of suicide on the African continent and the 7th in the world. With a rate over double the global average of 11.4 per 100 000, the situation has improved over the years. For example, in 2016 the suicide rate was estimated at 8.4/100 000 inhabitants [3].

The non-existence or fragmentation of suicide record systems in most LMIC's makes it difficult to assess the magnitude of the problem in these regions. Therefore, there is a need for improved and expanded surveillance of suicide in order to provide sufficient evidence for its prevention. Several criteria and guidelines were established to assist the process of evaluating the functionality of the Suicidal Health Surveillance Systems (HSS).

It was essential to evaluate the Suicide Registration System in the cities of Maputo and Matola (SRSMM) to have an overview of the system (including data flow) and assess the suicide burden in the population. If effective, the system can be used to identify the age groups and areas most affected by suicide.

Methods

Study design

In this research, suicide is defined as “*death caused by self-directed injurious behavior with any intent to die as a result of the behavior*” [9].

For this descriptive evaluation we reviewed the electronic database from the Legal Medicine Service (LMS) at the Maputo Central Hospital (HCM), the reference health facility for all cases of extra-hospital deaths (including suicides) that occurred in Maputo (capital city of Mozambique and the main urban area) and Matola City (adjacent to Maputo), from 2016 to 2018. HCM is the only facility that has organized and systematic data on suicides on a national level.

System attributes

Based on the Centers for Disease Control and Prevention (CDC) updated guidelines for evaluating public health surveillance systems 2001, we used the following five attributes to assess the performance of the LMS database: simplicity, data quality, representativeness, stability, and usefulness. The choice of this method is because it allows gathering reliable evidence on the performance of the surveillance system [10]. For example: Is the system useful? Should the system be continued? These types of questions can be addressed by looking at key components of the system. The evaluation parameters used were by Moliner *et al*, adapted and used in different evaluation [11]. The quality data was classified based on parameters adapted from the research on completeness of the information system for elderly suicide in the State of Bahia, Brazil [12]. For each evaluated attribute, the evaluation criteria are found in the results table 2.

Data collection

In order to access the system's attributes, we developed a semi-structured questionnaire to interview a coroner medical, a criminalist, a data typist and a psychiatric to collect information on the usefulness of the surveillance system and assessment of the system's attributes. The questionnaire had 4 sections and was directly linked to collection and recording data process. Permission to carry out the study was sought and granted by the health institutions. No names were used on the questionnaires, and the information was only available to those who were involved in the study.

Ethical considerations

This study was conducted thanks to the approval by Maputo Central Hospital after a letter for the release of data was sent. Secondary data was used for this study and no ethical clearance was required; Verbal consent of the key informants was obtained before the interview was conducted.

Results

Description of the system

The Mortality Health Information System (SIS-MOR) was established between 2008-2009, with mandatory certification as causes of death[13]. This system was subdivided into the Hospital Death Registration Information System (SIS-ROH) administered by the Maputo Central Hospital and the Extra-hospital Death Registration Information System (including suicides) managed by the Pathological Anatomy Forensic Medicine Service. Its main task is to identify the cause of death and the legal medical etiology.

When a suicide occurs in community, the local non-governmental authorities (community leader, head of block) inform the local police, which in turn activates a team from the National Criminal Investigation Service (SERNIC), which through a criminalist, confirms the death, collects preliminary data, and removes and sends the body to the LMS/HCM.

Upon the dead body entering the LMS/HCM, the coroner medical records the death and performs the autopsy. After the autopsy, three copies of the death

certificate (DC) are issued, the original is delivered to the family for legal purposes, and the second and the third remain in the local archive.

Key Findings

Between 2016 and 2018, 289 suicide cases were registered in Maputo and Matola. In 2016, 2017 and 2018 there were 154 cases, 66 cases and 69 cases reported respectively [Figure 1](#). During this time period, the rate of suicide in Maputo and Matola was 14.3, 6.1 and 6.4 per 100 000 people, respectively.

The largest proportion of cases of suicide between 2016 and 2018 was reported among men (75.8%), from ages range of 20-29 (31.8%). The majority of cases were from Maputo City (64.0%), had completed primary education (44.6%), were single (86.9%) and were self-employed (56.1%). The most common methods of suicide were hanging and consumption of sub-organic chemicals with 249(86.2%) and 29 (10.0%) cases respectively [Table 1](#).

Evaluation Results

Simplicity: The structure, functionality and its actors are well defined at each stage, namely: i) SERNIC: on-site expertise and removal of the body; ii) Forensic doctors: autopsy and identification of the type and cause of death; iii) LMS: database and DC emission. The system is a complex one because the items evaluated scored 6.0 points due to data sources and several intervening entities [Table 2](#).

Data quality: A total of 2810 fields observed in the assessment, of which (3.4%) presented some type of problem in filling in the variable. A total 96.6% fields were filled out properly, which classifies the SRSMM as excellent data quality. The following variables contained no blank entries, resulting in 100 percent completeness: province, district, sex, age, marital status, mechanism, date and time of the event. Data on occupation and education were 93.2% and 72.7% complete, respectively [Table 3](#)

Representativeness: The system is able to identify all population groups and subgroups in which cases, by person, time and place. All suicide deaths were mapped by Maputo city districts (Kampfumo, Kamaxakeni, Lhamankulo, Kamavota, KaMubukwana, Katembe Kanyaka) and Matola

City [Figure 2](#). The total data reported representativeness was classified in 95.8%. Maputo City had a representativeness of 64% and Matola 36.0%. Only the Kanyaka district in Maputo City did not report data [Figure 2](#).

Stability: According to the interviews, the system has never stopped working since its creation. There is no specific legislation that regulates suicide deaths (0 points). Besides the fact that the system is able to provide data in a regular basis, data demonstrated that it remained unrecorded for 4 months of 2017 [Figure 1](#), the system as classified has regular (2 points).

Usefulness: The system is useful for monitoring suicide cases, scoring 10 points, distributed as follows: identify the type and cause of death (4 points); identify the population affected by suicide (4 points); contribution to the detection and prevention of suicide (2 points). All respondents (100%) alluded to the fact that the system is useful for clarifying the cause of death and the circumstances surrounding it. They also considered the system important for improving the vital records system [Table 1](#).

Discussion

This is the first research of evaluation of suicide system in Mozambique using the CDC surveillance system guidelines in Mozambican capital city of Maputo. The conclusion of this evaluation proved that the SRSMM is complex, it has good data quality, is representative (per person, time and place) and is useful for improving vital statistics.

In this study, most suicide cases occurred in men. This result is aligned with the literature where about three-quarters of all suicide deaths occur in single men [\[3,6,14-16\]](#). Men generally prefer more fatal methods, such as hanging, jump from high places, while women tend to less fatal methods, resulting in more suicide attempts [\[17-19\]](#). In our evaluation, most suicide cases occur in young adults from 20-29 (31.8%). At the global level, most reported cases occur in young men. Besides the fact that little is understood about what motivates young males, most

reasons are attribute to mental disorders, family factors, gender stereotype [\[20\]](#) (men are often seen as "tough" and "strong") and others. Also, it could be due to countries' differing "age pyramids" [\[21\]](#). Due to cultural and religious factors, suicides can represent an unknown percentage of reported deaths.

In Mozambique, there is a multitude of institutions involved in the investigation and reporting of suicide cases. This include the police, SERNIC, Legal Medicine which results in several sources of data on the same case.

In this evaluation, data quality was excellent. However, as in other African settings, we found key data elements are frequently missing or not collected [\[22\]](#). This critical information includes details of the event, such as risk and protective factors, place of occurrence, alcohol and/or drug abuse, as well as individual and family medical history: mental, previous suicidal behavior, and psychiatric [\[4,9,23\]](#). The system does not collect or report self-harm or suicide attempts. Those missing data are necessary to enhance the usefulness of the system.

Representativeness of SRSMM in each city was considered high according to the defined parameters. Kanyaka district (island) is a place of difficult access and with low population density, which may have contributed to the lack of data.

From the public health point of view, there is a relationship between suicide attempts and the suicidal act itself. Therefore, these manifestations of the desire to kill must be treated as soon as possible. Thus, it is necessary to investigate the causes of suicide and suicide attempts [\[12\]](#). It is necessary to implement surveillance system focused on suicide attempts, as noted by others [\[4,7\]](#). Analysis on prevalence, social characteristics, and mental health of those involved are needed to monitor trends and define appropriate prevention strategies for integration in social and health programs.

Conclusion

The SRSMM was considered a complex system, useful for monitoring suicide cases and had good data quality. The deficits pointed out in this assessment should trigger changes in order to make the system more functional. Important steps must be taken to increase data integrity, to improve the quality of information about the circumstances of deaths, and to better identify risk groups. Mozambique does not have a comprehensive vital registration system at the national level. Also, a national suicide attempt surveillance system needs to be developed.

The most frequent cases of suicide were male individuals, young age, low education and allied to self-employment or precarious employment. The findings suggest the need for in-depth research using primary data on factors associated with suicide. These findings may also contribute to better targeting of health interventions, optimizing resources and efforts, especially in the prevention of suicide.

What is known about this topic

- Monitoring the health information system for suicide is important to document data consistency and to generate timely information for public health decision making;
- Quality control of suicide registry systems that monitor the changing rates, demographic and social profile and behaviors is essential for planning and implementing of prevention interventions.

What this study adds

- Need to add missing variables to the database and expand it nationally in order to have an overview of the severity of suicide;
- Psychosocial monitoring and support to at-risk groups, namely adolescents and young people, especially with psychosocial disorders;
- Is important to implement a surveillance system, that focuses on suicide attempts and

self-inflicted injuries to have an overview of the magnitude of suicide in Mozambique and to develop programs to reduce suicide rates.

Competing interests

The authors declare no competing interests.

Authors' contributions

EMC participated in all stages, from project preparation until to the final writing of manuscript. IM participate in the supervision of the activity. CB provided and a critical review of the report and the manuscript. All authors read and approved the final version of the manuscript.

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Table 1: General characteristics of individuals who committed suicide, SRSMM 2016-2018

Characteristics	Total (N=289)	%
Sex		
Male	219	75.8
Female	70	24.2
Age (years)		
≤ 19	41	14.2
20-29	92	31.8
30-39	57	19.7
40-49	32	11.1
50-59	31	10.7
≥60	36	12.5
Provenience		
Matola City	104	36.0
Maputo City	185	64.0
Relationship status		
Single	251	86.9
Married	31	10.7
Divorced	4	1.4
Widowed	3	1.0
Occupation		
Self-employed	162	56.1
Student	40	13.8
Private Sector	25	8.7
Public agent	17	5.9
Unemployed	27	9.3
No information	18	6.2
Academic level		
Primary	129	44.6
Basic	42	14.5
Medium	34	11.8
Higher	3	1.0
No information	80	27.7
Method used		
Hanging	249	86.2
Ingestion of toxic substance	29	10.0
Firearm firing	5	1.7
Jumped from high place	3	1.0
Others	3	1.0

Table 2: Attributes assessed from the suicide data base, Maputo and Matola City, 2016-2018				
Attributes	Classification	Criteria analyzed	Classification	
			Parameters assessed	Final score
Simplicity - Structure and ease of operation. The flow of notification from the community to the Central level	Complex (C): less than 10; Simple (S): equal or greater than 10	Technical structure	Well-structured: 2.5 Poorly structured: 0	6.0 points Complex
		Quantity of variables to be filled in the DC	≤27variables 2.5 > 27 variables 0	
		Notification levels	Up to 3 levels: 2.0 More than 3 levels: 0	
		Number of intervening and data source;	≤ 2 entities: 5 > 2 entities: 0	
Data quality - completeness and validity of recorded data in the system. Data must be <i>correct, complete, consistent, and timely.</i>	Score: 0 to 100% E: excellent (> 95%); G: good (95% to 90%); RE: regular (89% to 80%); B: Bad (71% to 51%); VB: Very bad (50% or less)	Data duplication	E: excellent (> 95%) G: good (95% to 90%) RE: regular (89% to 80%) B: Bad (71% to 51%) VB: Very bad (50% or less)	96.6%, Excellent
		Completeness: quantities of fields not filled in;		
		Data validity: Data coherence between profession and academic level;		
Representativeness – The ability of the system to accurately describe the occurrence of the event over time and distribution in the population by place and person	Score: 0 to 100% High: ≥ 85% Low: <85%	Description of cases by age and sex.100% Time trend;100% Place: 87.5%	High: ≥ 85% Low: <85%	95.8% High
Stability – The ability of the of system be operational when needed and confidence that inspires operators	Unstable (Bad): 0-1 Regular: 2 Stable: 3 (Good)	Number of times the system went out of operation / year	Has stopped: 0 Did not stop:1	2 points Regular
		Provide data, regularly without fail / year;	Failed: 0 Did not fail: 1	
		Existence of regulations for handling suicide cases.	Yes: 1 No: 0	
Usefulness - contribution in the detection and prevention of suicides	Not useful: 0 to 5; Regular: 6 to 9; Useful: 10 to 11; Very useful: 10 to 13	Identify the type and cause of death;	Yes – 4 No – 0	10 points Useful
		Identify the target population affected by suicides;	Yes – 4 No – 0	
		Contribution to suicide detection and prevention	Yes – 5 No – 0	

Table 3: Assessment of completeness of suicide data, Maputo-Matola, Mozambique, 2016-2018

Year	2016		2017		2018		Total	
Variable	%	Score*	%	Score*	%	Score*	%	Score*
Province	100	E	100	E	100	E	100	E
Date	100	E	100	E	100	E	100	E
District	100	E	100	E	100	E	100	E
Sex	100	E	100	E	100	E	100	E
Age	100	E	100	E	100	E	100	E
Marital status	100	E	100	E	100	E	100	E
Education	71.4	B	75.6.9	B	71	B	72.7	B
Occupation	96.1	E	87.9	R	95.6	E	93.2	G
Hours of the event	100	E	100	E	100	E	100	E
Methods	100	E	100	E	100	E	100	E
Total deaths	154		66		69		289	

Legend: *E: excellent (greater than 95%); G: good (95% to 90%); RE: regular (89% to 80%);B: Bad (71% to 51%); VB:Very Bad (50% or less)

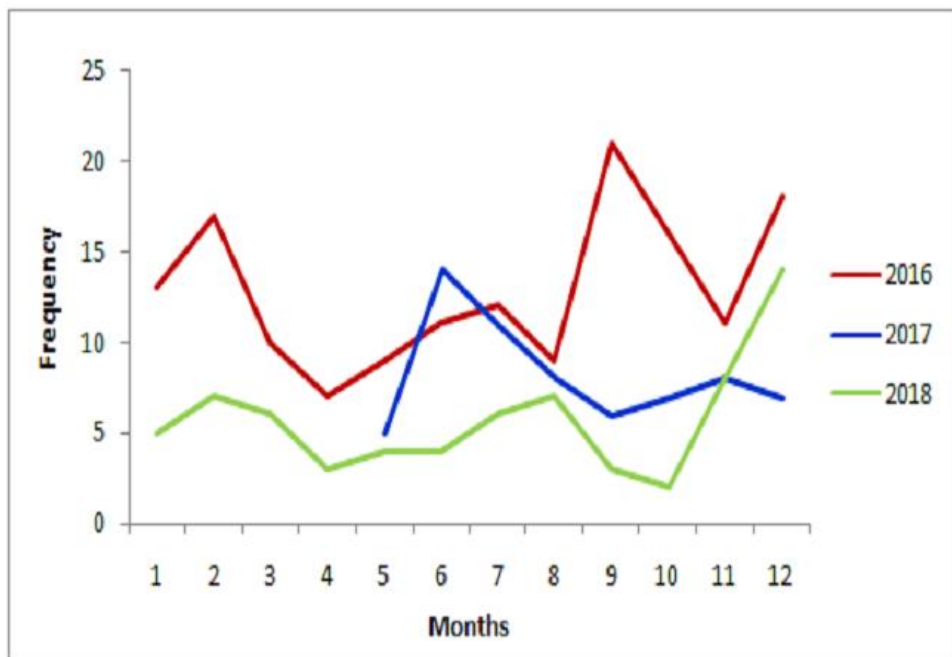


Figure 1: Monthly trends in suicides by year, RSSMM 2016-2018

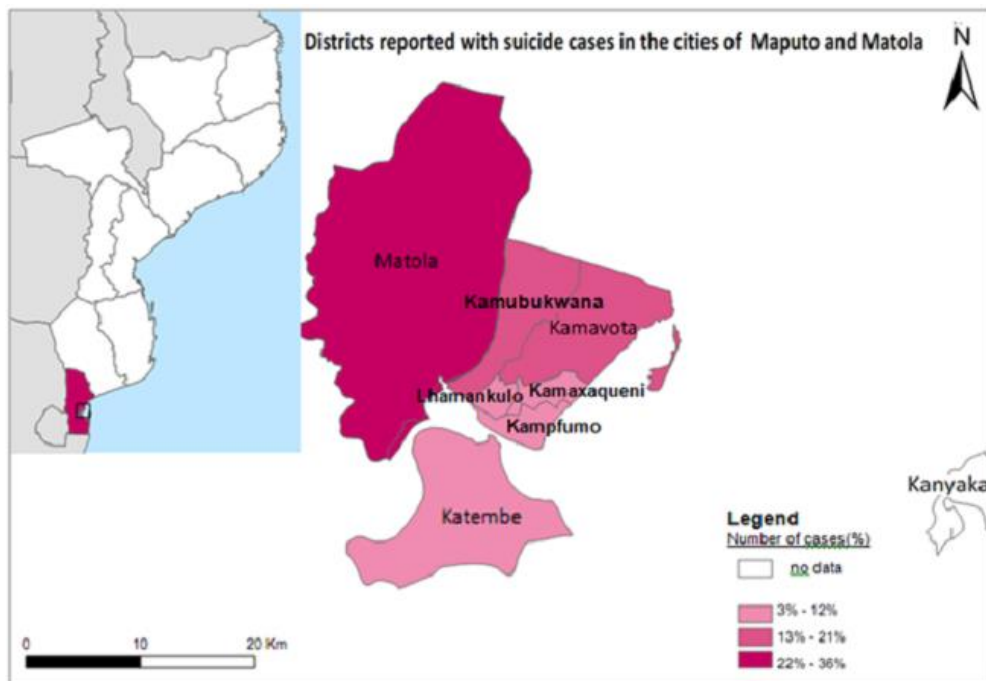


Figure 2: Map of suicide distribution by district in Cities of Maputo and Matola