


# BMJ Open Implementation of a comprehensive surveillance system for recording suicides and attempted suicides in rural India

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## ABSTRACT

**Introduction** WHO reports that 78 of the 140 low-income and middle-income countries (LMICs) do not have a registration system for suicides and attempted suicides. Absence of data on suicide and attempted suicide in LMICs, which account for 79% of suicides worldwide, is a major impediment in understanding the magnitude of the problem and formulating prevention strategies to reduce suicide and self-harm. A comprehensive surveillance system has the potential to address this data gap. The objective of this study is to describe the development of a comprehensive surveillance system in rural India by adding a community based component and reflect on its added value in obtaining data on suicide and attempted suicide compared with relying only on hospital and police records.

**Method** The comprehensive system consists of three components. Community surveillance involved collecting information on suicides and attempted suicides from third party key informants such as village heads, teachers, priests, shopkeepers, private physicians, private hospitals and community health workers. The second component consisted of data from public health facilities. The final component consisted of suicide data from police records. Information was collected for a period of 12 months from August 2018 to July 2019 from 116 villages (population 377 276) in Gujarat, India.

**Results** An average of 710 community informants were interviewed each month (mean: 6.72 informants per village). The community surveillance system identified 67 cases of suicide compared with 30 cases by hospital and police records (Cochran's Q test 67.9  $p < 0.01$ ) and 70 attempted suicides compared with 51 from the hospital and police records (Cochran's Q test 66.6  $p < 0.01$ ).

**Discussion** This is the first report of implementing a large-scale comprehensive surveillance system for suicide and attempted suicide in a LMIC. The combination of community surveillance system and official data from hospital and police records addresses the problem of under-reporting of suicide and suicide attempts in India and other LMIC.

## INTRODUCTION

Suicide is a global public health problem accounting for 1.4% of all deaths worldwide,

## Strengths and limitations of this study

- The study shows a community surveillance system collecting granular monthly data on suicides and attempted suicide with the help of community-based third-party informants is feasible in a low-income and middle-income country (LMIC).
- Community-based informants can identify suicides more comprehensively than hospital and police records.
- Third-party reporting can help overcome the barrier of stigma and minimise under-reporting, but authenticity of the information needs to be substantiated through triangulation.
- Community surveillance system, coupled with hospital and police records, is a useful tool to address under-reporting of suicide and attempted suicides in India and other LMIC.
- Community surveillance may underestimate attempted suicides as compared with a household survey.

making it the 18th leading cause of death in all age groups and the second leading cause of death among young adults between 15 and 29 years of age.<sup>1</sup> Suicides occurring in low-income and middle-income countries (LMIC) contribute to 79% of the suicides globally.<sup>2</sup>

Compared with other countries, suicides rates are higher in the South Asia region<sup>3</sup>; WHO has estimated that WHO South-East Asia Region accounts for 39% of global suicides and represents 26% of the world population.<sup>1</sup> Of the total estimated 817 000 global deaths by suicide reported in 2016, India alone accounted for 36.6% of global suicides in females and 24.3% in men and suicide is the leading cause of death among Indians aged 15–39 years of age.<sup>4</sup>

A recent WHO report on suicide prevention states that only 60 of 172 member countries have good-quality data on suicide, and

78 out of the 140 LMIC do not have any vital registration systems in place.<sup>5</sup> WHO has developed a manual on case registration which extensively describes the processes to establish a registration system at the structural/institutional level.<sup>6</sup>

The stigma associated with suicide, illegality of suicide in some countries and inefficient or absence of registration systems lead to gross under-reporting of suicides in LMIC. Lack of reliable data on the number of deaths by suicide and attempted suicides in LMICs is an important barrier to measuring effectiveness of suicide prevention strategies.<sup>1</sup> Accurate and reliable data on suicides is crucial in informing policy makers in making effective decisions and investments in suicide prevention efforts, in quantifying the public health costs of suicide and to enact strategies that combat stigma-related issues.<sup>7</sup>

Suicide data in India are officially recorded and publicly reported on an annual basis by the National Crime Records Bureau (NCRB) which collates suicide data from police records across the country, but does not record attempted suicides. In 2018, the NCRB estimated India's suicide rate at 10.2 per 100 000,<sup>8</sup> whereas the WHO estimate was 16.3<sup>9</sup> suggesting that NCRB data are a significant underestimate of the true rate. The Million Death Study<sup>10</sup> also concluded that NCRB underestimates suicide deaths in males by at least 25% and females by at least 36%. Research has shown that under-reporting happens due to classification of deaths due to suicide under various 'hidden' causes<sup>6 11 12</sup> such as accidental deaths, illnesses and/or undetermined deaths, largely made up of drug poisoning and intoxication<sup>12</sup> due to stigma associated with suicides and attempted suicides.

There is no official record of the numbers of attempted suicides in India, as this is not collected systematically by any governmental agency regionally or nationally. Available research on suicide attempts is limited to several small clinic-based studies reporting sociodemographic features of individuals who attempt suicides.<sup>12-14</sup> Estimates from across the world show that for each death by suicide, there are likely to be 20 or more non-fatal attempts.<sup>11</sup> Attempted suicide was a punishable offence in India until 2017, which created a significant barrier to suicide reporting.<sup>15</sup> This also resulted in those attempting suicide and their families avoid seeking help from formal health services or reporting other reasons. India has enacted a new law, the Mental Health Care Act, 2017, making India's archaic law redundant.

Considering the gross under-reporting of suicide and attempted suicide in India and other LMIC, establishing a comprehensive surveillance system to gather data on suicidal behaviour is crucial to more accurately assess the effectiveness of suicide prevention interventions. The current study reports on the added value and process of establishing a comprehensive surveillance system in India. This system was established to collect baseline data on suicidal behaviour as part of the Suicide Prevention and Implementation Research Initiative (SPIRIT) project.<sup>16</sup>

The objectives of the study were twofold: (1) To assess the feasibility of adding community-based surveillance data collection to hospital and police records to create a comprehensive suicide surveillance system and (2) To assess the added value of the community surveillance in obtaining additional suicide and attempted suicides data by comparing it to data from hospital and police records.

## METHODOLOGY

### Context

The SPIRIT is a US National Institute of Mental Health-funded study on suicide prevention using an integrated community suicide-prevention intervention. The study is being implemented in the district of Mehsana in North Gujarat, India. This study has been described extensively elsewhere.<sup>16</sup>

From the pool of 614 inhabited villages, 124 villages were randomly chosen. Village councils were approached for participating in the SPIRIT trial and allow implementation of SPIRIT's suicide surveillance system in the villages. Of the 124 villages, 54 villages in the intervention arm and 62 villages in the control arm agreed to participate in the trial.

### Duration

The study period for development and implementation of the comprehensive surveillance system was August 2018 to July 2019.

### Development of the community suicide surveillance system

#### Design

This surveillance system is based on the methodology used to establish surveillance systems for disease monitoring and has been used for collecting data on suicidal behaviour previously in India.<sup>17</sup> It involves collecting information on suicide attempts and suicides from third-party key informants. Although verbal autopsy has been conducted in other studies,<sup>10</sup> we chose to use community-based third-party informants for two reasons (1) the death registration system is poor in India, as only 79.6% of deaths are registered<sup>18</sup>; and (2) this was a feasible and preferred way to obtain regular monthly data on suicide attempts in the community. Informants were identified based on a mapping exercise to understand contextual factors and a pilot conducted in four non-study villages. These informants were the residents of the village and information was collected on a monthly basis. They resided at a caste-based hamlet (vaas in Gujarati) in a village. One key informant was chosen from each of these hamlets to ensure adequate coverage. These informants were knowledgeable about the village dynamics, geography, sociocultural factors, births and deaths in the villages. Informants included village council head, school principal, community-priests, leader of the milk cooperatives, private physician, shopkeepers and other members of the community. They also included community health workers such as accredited social health activists (ASHA),

Anganwadi workers, (the focal point for implementation of all the health, nutrition and early learning initiatives at grassroot level in India), female health workers and multi-purpose health workers and private hospitals. Informants were approached every month by trained staff (research officers, RO) to gather details about individuals who have attempted suicide or have died by suicide in their villages. Informed consent was obtained from all the informants. Confidentiality was assured for every informant given the sensitive nature of the information they share. Collected data were triangulated and analysed.

### Patient and public involvement

Community-based informants were involved in mapping and identification of other potential informants in the villages who could be familiar with the health-related emergencies and other day-to-day happenings in the vicinity, who could inform about the incidences taking place in previously under-represented hamlets. They were also consulted for identification of nearby health facilities where attempters or individuals who died by suicide could be taken for treatment or other medical investigations.

### Selection and training of ROs

Six ROs with master's degree in social work or psychology and at least 6 months of field experience in health programmes were selected. They underwent a 2-day training on establishing rapport with the informants, interviewing skills, completing case record form, planning data collection and risk mitigation. Each RO was allotted 20–23 villages for data collection. Prior to data collection, villages were mapped for understanding local contextual factors. The mapping exercise enabled the ROs to identify key informants from different geographical areas within the village. A training manual outlining the processes of community surveillance was developed and piloted in four villages not included in the SPIRIT project and appropriate modifications were incorporated. ROs received continuous mentorship and supervision.

### Community data collection

A semistructured interview schedule, a standardised tool for recording every informant's response (see online supplemental annexure 1 part-1) was used for collecting data on suicide attempts and suicides in a village every month. This interview began by asking the informants if they were aware of any suicides/attempted suicides that occurred in their village in past month. If the response was affirmative, then the informant was asked to provide further details of the concerned person, details of the incident, and whether the person was taken to any health facility for care. ROs were trained to record as much information as provided by the key informants, as not all informants were able to give all of the above details. Details of each case reported by a key informant were recorded in an individual case report form (CRF) (see online supplemental annexure 1 part-2). As under-reporting of suicide attempt or suicide is quite common, even if one

informant reported an incident, it was recorded in the system. Incidents reported retrospectively (beyond past 1 month but within 3 months) were also recorded. An Enhanced Usual Care Template listing local resources available in that region for mental healthcare was given to the key informant at the end of the interview. Informants were instructed and encouraged to share this document with anyone in distress.

### Data from health facilities

Data on attempted suicide and suicide were collected from the regional public and private health facilities that had inpatient care facilities, which constitute healthcare facilities where people from SPIRIT study villages may have sought care or been referred to in the event of a suicide attempt. Some health facilities already record this data systematically, whereas other facilities had no data reporting system in place, or the system did not collect adequate data of the index case. To support the latter group of health facilities, the project team introduced a data collection system based on the CRF (see online supplemental annexure 2). Data from health facilities were collected every 3 months.

### Data from police records

Data for all unnatural deaths recorded at police stations in Mehsana district was collected annually for the study period. Of these, records for the SPIRIT villages were identified and segregated into accidental deaths, suicides and undecided cases. The police reports of the undecided cases were further perused, content analysed and discussed by two independent researchers to reach a consensus whether these cases were suicides or otherwise.

### Triangulation of data

Details of each case reported by a key informant were recorded in an individual CRF (see online supplemental annexure 1). Data collected from multiple informants were compiled together, cross-verified and triangulated by independent trained research staff who were not involved in data collection. This was done to arrive at an index episode of suicide attempt or suicide. Similarly, information received from public health facilities and police records were also reviewed and triangulated by independent research staff. For every unique case, a triangulation sheet with unique ID was maintained at the site. The triangulated data were deidentified and recorded in a customised electronic data capture interface. At the same time, a personally identifiable information sheet was also maintained to distinguish between a new unique case or an already identified case (duplicate or common case). In order to identify a common case, village, sex, method, date of the incidence and age were primarily considered as the most reliable variables to be matched across all the data sources. If there was a discrepancy in the data obtained from the three sources, preference was given to the data obtained from the hospital and police record. Accordingly, corrections were incorporated in

the triangulation sheets as well as data entered electronically. Similarly, when a common case was found, corrections were done in the triangulation sheets and the data entered electronically. In case of suicides reported only by community surveillance, we verified these deaths using village-level death registry at the end of the year. Four villages refused to share the data and in one village the register was sent to the district. Initially we perused the aggregated death registry at the district office and found that the details were sketchy. Hence, we decided to get the information from individual register maintained by the Talati (Village Accountant).

To maintain quality of data collection, planned and unplanned visits were scheduled to the key informants every month. Accuracy of the triangulation was reviewed for all the cases recorded. Data entry as well as data corrections was monitored through an audit trail built into the electronic data capture interface.

Informed consent of all the key informants was obtained.

### Data analysis

All the data are presented as categorical variables and summarised as frequency counts and percentages. As this is nominal data, hypothesis testing was done using non-parametric tests. The Fisher's exact test was used to see differences in age, sex and methods of suicides and attempted suicides between the three sources of the information (community surveillance, hospitals and police records and common cases). To assess the added value of community surveillance in obtaining additional data on suicide and suicide attempts by comparing it to the data from hospital and police record, we used Cochran's

Q Test, a non-parametric test to find differences in matched sets of three systems (community surveillance, hospital records, police records) proportions. The test assesses whether the proportion of case/non-case is same between all the three systems.<sup>19</sup> Further, post hoc McNemar's  $\chi^2$  statistic was used to check statistically evidence of differences.<sup>20</sup> The individual alpha level is adjusted using the Bonferroni method to control the overall error rate.

### RESULTS

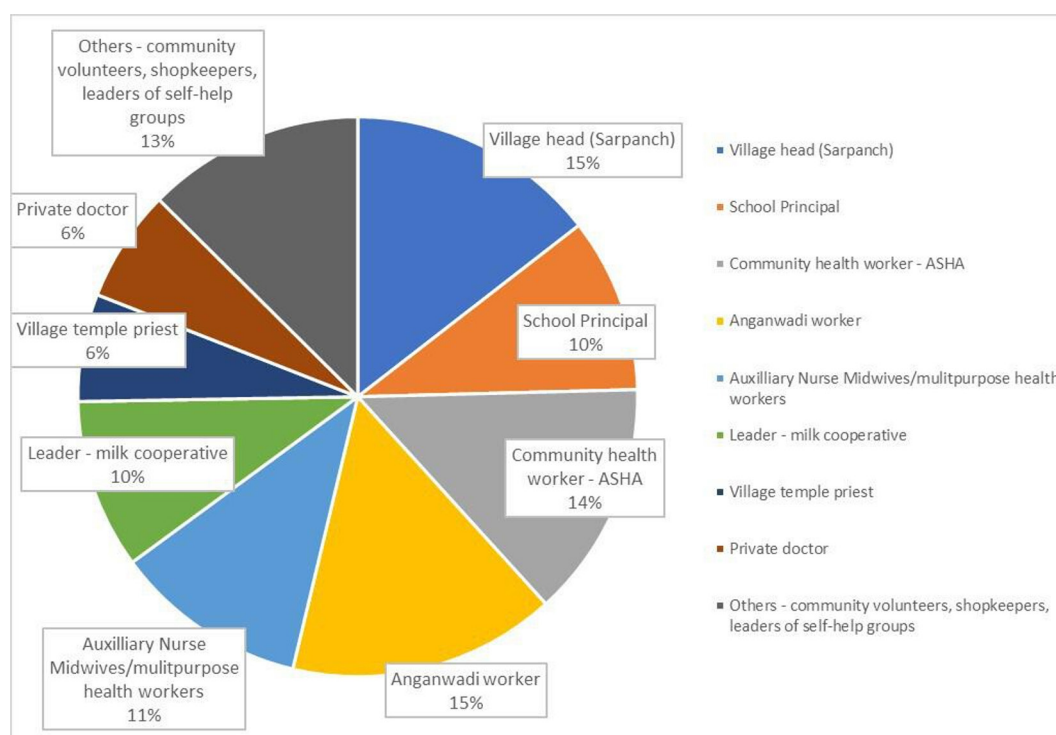
Of the 124 villages, the community suicide surveillance system was implemented in 116 villages which consented to participate in the study, covering 377 276 adults.

#### Community surveillance

In total, 833 informants initially participated in the community surveillance system, out of which 109 (13%) dropped out. On average, 710 informants were interviewed every month with a mean of 6.72 informants per village. Informants' categories are detailed in figure 1. Almost half (44%) of the informants were village heads, community health workers and Anganwadi workers. Shopkeepers and community volunteers constituted 13% of the informants.

The number of informants for each suicide/attempted suicide ranged from 1 to 8. Cases where there was only a single informant for a case of suicide/attempted suicide, these informants were mostly ASHA and Anganwadi workers. Overall, 42 attempted suicides and 26 suicides were identified by single informants.

To assess the validity of the community surveillance system, we matched the suicides detected only by



**Figure 1** Details of the informant categories. ASHA, accredited social health activist .

community surveillance (N=55) which were not recorded in the public hospital or police records, to the village level death register kept by Talatis. The information from the death registers (maintained by the Talatis, a local administrative officer) consisted only of demographic details of the deceased along with the details of the person to whom the certificate was issued. The Talathi records do not contain details of the cause of death, as these records are merely meant to serve as a record of death certificates issued by the Talati. We did not find a match for 10 cases (18.1%). These 10 cases mainly belonged to the two major categories: other backward classes (50%) and scheduled caste (40%). Qualitative information from the ROs revealed that individuals in these castes are more likely to have a low socioeconomic status and thus may have been reluctant to approach officials, for fear of harassment, which is not uncommon.

### Hospital and police records

Forty (22 private and 18 public health facilities) out of 53 health facilities in the district agreed to share data on suicides and attempted suicides who had sought care; 13 private facilities did not consent to share data; this may be due to attempted suicide being a medico-legal issue in India warranting legal compliance to report these cases to the police.

Data on all unnatural deaths filed under Section 174 of the Code of Criminal Procedure during the study period, from official police records, were received by the project team. Of the 32 unnatural deaths recorded during this study period, 46.8% were suicides, 21.8% were accidents, and of the rest, 6.2% were reassigned as suicides by researchers and 25% were in the undecided category.

### Number of suicide attempts and suicides

There were 118 suicide attempts and 82 suicides recorded from 116 villages using community surveillance system, public hospital and police records. Based on the collected data, the crude suicide rate and attempted suicide rate were calculated as 21.7 per 100 000 and 31.3 per 100 000, respectively.

### Demographic details of suicide attempters and suicides

Although suicides (76.8%) and suicide attempts (60.2%) among males were high, there was no statistical evidence of a difference for sex found between the source of data (three systems). We had data on age for 191 cases (113 suicide attempts and 78 suicides). The majority of suicide attempts (69.0%) were among individuals under 35 years of age, one-fourth (24.8%) were between 35 and 55 years and rest were above 55 years (6.2%). Around half of deaths by suicide (46.2%) were among individuals below 35 years of age, one-third (37.2%) were individuals aged 35–55 years and 16.7% were above 55 years of age.

### Methods used for suicide and suicide attempts

The method of suicide attempts and suicide emerging most frequently in the data were poisoning (83.1%

attempts; 31.7% suicides), of which 65.3% attempts and 69.2% suicides used pesticide ingestion as a means.

The other methods were hanging (4.2% attempts; 41.5% suicides), drowning (3.4% attempts; 15.9% suicides), self-infliction of injury (3.4% attempts; 2.4% suicides) and self-immolation (3.4% attempts; 2.4% suicides). Other less commonly used methods (2.5% attempts; 6.1% suicides) were acid pouring, overdose (medication) and jumping in front of a train.

We also assessed whether there were any differences in age, sex or method of suicides and attempted suicide between the three sources of information, however, there was no statistical evidence of a difference (table 1).

### Comparison of the ability of community surveillance in obtaining additional data (suicide and attempts) versus hospital and police records

Of the 118 suicide attempts, 67 cases were reported via community surveillance and 48 from the hospital records. Three cases of attempts were common among community surveillance and hospital records. Of the 82 suicides, 55 were recorded only through community surveillance, 8 were identified only from hospital records and 6 cases were identified only from police records. Two cases of suicides were common from all three systems. Two cases were common in community surveillance and hospital records. Eight cases were common in community surveillance and police records. Only one case was common among hospital and police records (table 2).

Table 3 illustrates that there was statistical evidence of a difference in the proportion of case/non-case for suicide attempts recorded through all the three systems (Cochran's Q: 66.6  $p < 0.01$ ). These differences were further assessed using post hoc McNemar's test for all three combinations (community surveillance and hospital records, community surveillance and police records, police records and hospital records). There was no statistical evidence of a difference between community surveillance and hospital records ( $p = 0.09$ ). Whereas, there was statistical evidence of a difference ( $p < 0.01$ ) between community surveillance and police records, and hospital records and police records.

Table 4 shows that the community surveillance system identified 67 suicides compared with 30 (13 plus 17) from the hospital and police records and the result was significant (Cochran's Q test 67.9  $p < 0.01$ ). Additionally, out of the 67 suicide attempts identified by community surveillance, informants reported that 58 individuals were taken to hospital for treatment, 8 were not taken to a hospital and for one case there was no information available.

### DISCUSSION

The aims of this study were to develop and implement a comprehensive surveillance system for suicides and attempted suicides consisting of community surveillance, hospital data and police records, examine the feasibility of implementing a community surveillance system and

**Table 1** Demographic differences between attempts and suicide cases for all the three categories (community surveillance, hospital and police records and common cases)

	Attempts (n=118)				Suicide (n=82)				P value
	Community surveillance (n=67)	Hospital and police records (n=48)	Common cases (n=3)	Total	Community surveillance (n=55)	Hospital and police records (n=15)	Common cases (n=12)	Total	
<b>Sex</b>									
Males	40 (59.7)	30 (62.5)	1 (33.3)	71 (60.2)	43 (78.2)	11 (73.3)	9 (75.0)	63 (76.8)	0.91
Females	27 (40.2)	18 (37.5)	2 (66.6)	47 (39.8)	12 (21.8)	4 (26.6)	3 (25.0)	19 (23.2)	
<b>Age</b>	(n=64)	(n=47)	(n=2)		(n=55)	(n=15)	(n=8)		
<35	41 (65.6)	35 (74.4)	2 (100.0)	78 (69.0)	24 (43.6)	8 (53.3)	4 (50.0)	36 (46.2)	0.96
35–55	18 (28.1)	10 (21.2)	–	28 (24.8)	21 (38.1)	5 (33.3)	3 (37.5)	29 (37.2)	
>55	5 (7.8)	2 (4.2)	–	7 (6.2)	10 (18.2)	2 (13.3)	1 (12.5)	13 (16.7)	
<b>Method</b>									
Drowning	4 (6.0)	–	–	4 (3.4)	6 (10.9)	3 (21.4)	4 (33.3)	13 (15.9)	0.17
Hanging	5 (7.5)	–	–	5 (4.2)	26 (47.3)	3 (21.4)	5 (41.7)	34 (41.5)	
Poisoning	53 (79.1)	42 (87.5)	3 (100.0)	98 (83.1)	18 (32.7)	6 (42.9)	2 (16.7)	26 (31.7)	
Self-infliction	1 (1.5)	3 (6.3)	–	4 (3.4)	1 (1.8)	1 (7.1)	–	2 (2.4)	
Self-immolation	1 (1.5)	3 (6.3)	–	4 (3.4)	1 (1.8)	–	1 (8.3)	2 (2.4)	
Others	3 (4.5)	–	–	3 (2.5)	3 (5.5)	2 (13.3)	–	5 (6.1)	

Values are presented as number (%).

**Table 2** Number of suicide attempts and suicides from community surveillance, hospital records and police records

Cases	CS	HR	PR	CS and HR and PR	CS and HR	CS and PR	HR and PR	Total
Suicide attempts	67	48	–	–	3	–	–	118
Suicide cases	55	8	6	2	2	8	1	82

CS, community surveillance; HR, hospital records; PR, police records.

evaluate the value of adding a community surveillance component in reducing under-reporting of suicides and attempted suicides as compared with only collecting such data from public hospitals and police records. The study reveals that the community surveillance system was able to identify additional 55 suicides and additional 67 attempted suicides compared with only 27 suicides and 51 attempts recorded in the hospital and police records in the 116 villages. The results suggest that adding a community surveillance component significantly improved the comprehensiveness of the suicide data and reduced the under-reporting of suicides as compared with relying solely on records from hospitals and police. Hence establishing such a system in addition to the existing official system is an effective mechanism to obtain a more comprehensive suicide data in rural India. This methodology may

**Table 3** Comparison of ability of community surveillance in obtaining additional data on suicide attempts compared with the hospital and police records

	Non-case	Case	Test statistics
Community surveillance	48	70	Cochran's Q test 66.6 (p<0.01)
Hospital records	67	51	
Police records	118	–	
Post hoc McNemar's test statistics			
Community surveillance	Hospital records		McNemar's $\chi^2$ test 3.14 (p=0.09) NS
Non-case	–	48	
Case	67	3	
Community surveillance	Police records		McNemar's $\chi^2$ test 63.0 (p<0.01)
Non-case	48	–	
Case	70	–	
Hospital records	Police records		McNemar's $\chi^2$ test 49.0 (p<0.01)
Non-case	67	–	
Case	51	–	

NS, not significant.

**Table 4** Comparison of the ability of community surveillance in obtaining additional data on suicide compared with the hospital and police records

	Non-case	Case	Test statistics
Community surveillance	15	67	Cochran's Q test 67.9 (p<0.01)
Hospital records	69	13	
Police records	65	17	
Post hoc McNemar's test statistics			
Community surveillance	Hospital records		McNemar's $\chi^2$ test 37.1 (p<0.01)
Non-case	6	9	
Case	63	4	
Community surveillance	Police records		McNemar's $\chi^2$ test 35.6 (p<0.01)
Non-case	8	7	
Case	57	10	
Hospital records	Police records		McNemar's $\chi^2$ test 0.67 (p=0.41) NS
Non-case	55	14	
Case	10	3	

NS, Not significant.

be particularly relevant to other LMIC with inadequate official reporting and recording systems for suicide and attempted suicide.

Results also reveal that there were 82 deaths by suicide and 118 attempted suicides during the study period. A large national epidemiological study from India<sup>21</sup> found that the attempted suicide: suicide ratio was 14.51 nationally, 8.90 in Gujarat and much lower at 1.43 in the present study. The epidemiological study mentioned above used household survey for estimating suicide attempts, while this study used third-party community informants. This may explain the lower rate in our study, as third-party informants may only be aware of serious suicide attempts. Community surveillance may, therefore, not be as effective in capturing all attempts, including medically non-serious attempts.

Sustainable Development Goal 3 (Health)<sup>22</sup> aims to reduce premature mortality from non-communicable diseases by a third, and suicide rates are one indicator (3.4.2) of this goal. In order to reach this target, it is essential that reliable data are collected by countries on both suicide and self-harm. WHO has produced two resources for registering suicides and self-harm behaviour (including attempted suicides); however, these are based on data obtained via official health records.<sup>1</sup> Community surveillance systems, such as the one described in this study, are an additional strategy to complement or augment the health system or registration system records and provide data where such systems do not exist. Further this could also be useful to monitor local trends and evaluate suicide intervention strategies.



There are several challenges to developing and implementing a community surveillance system. First, informants were initially wary of sharing information about their community members, expressing concerns about confidentiality of such information resulting in conflict with survivors and their families if such information became public. Second, the possibility of getting entangled in legal problems either with police or with survivors and their families was also an issue. Repeated contact to establish rapport, assurance of privacy and confidentiality, and consistent approach towards data collection helped informants share the information without fear of legal or social conflicts.

## LIMITATIONS

The use of third-party informants is a major limitation, and direct confirmatory interviews with survivors or their families were not done to ensure informant confidentiality. Verbal autopsy was considered unfeasible as we wanted to design a system which could be easily replicated in routine practice with regular monthly data collection and scaled up in situations of limited resources.

The other limitation is obtaining third party information on suicide attempts. The gold standard is to do a household survey but that was not feasible as a routine method for data collection every month across large geographical areas, as is the case in the present study. We were keen to test the feasibility and utility of adding community surveillance to the existing hospital and police records to reduce under-reporting of suicide attempts. The only indirect validation we can provide is that there was no difference in age, sex or method between community surveillance data and hospital and police data. However, as majority of the suicide attempts have been reported by community health workers like ASHAs and Anganwadi workers, who we believe are likely to be the more reliable sources of information.

Another limitation is that not all suicide attempts registered at the hospitals were picked up by community surveillance and this highlights the need to combine community surveillance with hospital data for more comprehensive data on attempted suicides. A possible explanation could be that the visit or stay in the health facility was kept confidential or attributed to other health conditions by the family. It is also not known where the 58 attempters identified by the surveillance system were treated. As Ahmedabad (the nearest city) was just 1 hour away, many attempted suicide cases may have sought care there, as there are better medical facilities and also a large urban city away from the village could have provided anonymity to the individual and their families. It is also possible that these attempts may have received treatment from private practitioners or practitioners of traditional and alternate systems of medicines in neighbouring villages which are not part of the study villages. Further research is needed to identify the gaps in the system.

A final limitation is that in 68 cases the information was from a single informant. However, the majority of single informants were ASHAs and Anganwadi workers who live in the community and are knowledgeable about the community members.

Despite these limitations, such a community surveillance system is important in capturing additional sources of suicide attempts and suicides in an LMIC like India, where suicides are a leading cause of death, particularly among young people. Strengths of the study are the variety and number of informants used thus ensuring coverage of entire villages, triangulation of data to avoid attempts or deaths being counted more than once, collecting data each month to avoid recall bias and built-in fidelity checks within the surveillance system to ensure quality of data collection.

The community surveillance system also enables capturing more frequent and real-time sort of data on suicide attempts and suicides. WHO also supports the idea of obtaining suicide data on a monthly basis from sources of information such as hospital records, general practitioners, community health workers, teachers, religious leaders, other gate keepers.<sup>23</sup>

## CONCLUSION

This is the first report of implementing a community suicide surveillance system for suicide and attempted suicide in an LMIC. Community surveillance systems added to hospital and police records can be an effective tool to obtain more comprehensive data on suicide and attempted suicide, understand local trends and methods of suicide, and obtain insights into the impact of interventions on suicide attempts and suicide in a specific catchment area. Ultimately, the combination of a community surveillance system and data from health system records are likely to address the problem of under-reporting of suicide and attempted suicide in LMIC.

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**Contributors** The PIs (LV, SP, LS-Z) conceptualised and designed the community surveillance system. NJ, SK, JK developed training manuals, delivered trainings and implemented the roll out of the surveillance system. RN, DP managed and analysed data respectively. All the authors contributed to the drafting of the main text.

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**Patient consent for publication** Not required.

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## ANNEXURE 1

<b>Case Report Form – Suicide Surveillance System - Part 1</b> કેસ રિપોર્ટ ફોર્મ –આત્મહત્યાના નિવારણ માટેની નિરીક્ષણ વ્યવસ્થા (સુસાઈડ સર્વેલન્સ સિસ્ટમ)																		
<b>A. Village Code:</b> ગામનો કોડ: <input type="text"/> <input type="text"/> <input type="text"/> <b>Village name:</b> ગામનો નામ:	<b>B. Taluka:</b> તાલુકો	<input type="checkbox"/> <b>Intervention</b>  <input type="checkbox"/> <b>Control</b>																
<b>C. Code of the Surveillance Officer:</b> નિરીક્ષણ કરનાર અધિકારીનો કોડ <input type="text"/> <input type="text"/>	<b>D. Date: તારીખ:</b> <table border="1" style="display: inline-table; margin-right: 10px;"><tr><td><input type="text"/></td><td><input type="text"/></td></tr><tr><td>D</td><td>D</td></tr></table> <table border="1" style="display: inline-table; margin-right: 10px;"><tr><td><input type="text"/></td><td><input type="text"/></td></tr><tr><td>M</td><td>M</td></tr></table> <table border="1" style="display: inline-table;"><tr><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td></tr><tr><td>Y</td><td>Y</td><td>Y</td><td>Y</td></tr></table>		<input type="text"/>	<input type="text"/>	D	D	<input type="text"/>	<input type="text"/>	M	M	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Y	Y	Y	Y
<input type="text"/>	<input type="text"/>																	
D	D																	
<input type="text"/>	<input type="text"/>																	
M	M																	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>															
Y	Y	Y	Y															
<b>E. Consent of the informant obtained?</b> માહિતી આપનાર પાસેથી સંમતિ લીધેલ છે? <input type="checkbox"/> Yes <input type="checkbox"/> No હા ના	<b>F. Study ID (Copy from the consent form):</b> (સંમતિ પત્રકમાંથી કોપી કરો): <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>																	
<b>Source of information (tick one option only):</b> માહિતીનો સ્ત્રોત: (કોઈ પણ એકની સામે (✓) ની નિશાની કરો)																		
<input type="checkbox"/> Head of the village (Sarpanch) ગામના વડા(સરપંચ)	<input type="checkbox"/> School principal/teacher શાળાના આચાર્ય/શિક્ષક	<input type="checkbox"/> Dudh Mantri દૂધ મંત્રી																
<input type="checkbox"/> Community /Village Temple Priest ગામના મંદિરના પૂજારી	<input type="checkbox"/> Police પોલીસ	<input type="checkbox"/> Anganwadi worker આંગણવાડીના કર્મચારીઓ																
<input type="checkbox"/> Private physician ખાનગી તબીબ (ડોક્ટર)	<input type="checkbox"/> Accredited community health workers (ASHA) માન્યતા પ્રાપ્ત સામાજિક આરોગ્ય કાર્યકરો																	
<input type="checkbox"/> Auxiliary Nurse Midwife (MPHW/FHW) સહાયક નર્સ	<input type="checkbox"/> Others; specify: _____ અન્ય ; સ્પષ્ટ કરો:																	
Do you know of someone who has either attempted suicide or died by suicide in your village in the past month? શું તમે એવા વ્યક્તિને જાણો છો કે જેણે ગયા મહિને તમારા ગામમાં આત્મહત્યા કરવાનો પ્રયાસ કર્યો છે અથવા આત્મહત્યા કરી છે?																		
<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure હા ના ચોક્કસ નથી																		
If Yes, <input type="checkbox"/> Attempted Suicide <input type="checkbox"/> Death by Suicide જો હા તો, આત્મહત્યાના પ્રયાસો આત્મહત્યા કરી હોય																		

Number of cases: \_\_\_\_ No. of attempted suicide: \_\_\_\_ No. of deaths by suicide: \_\_\_\_

Note: For every informant reporting an attempted suicide or suicide, complete part 2 of the CRF separately. Similarly, complete separate CRFs for every instance reported.

**Write specifications of the informant's work.**

For example, if you are interviewing a community priest who is specifically involved in the cremation practices, write 2-3 sentences about his work – where he works [name of the village(s)], for which communities (whether he works for all the communities or any specific ones), number of times a week/month he is involved in this work, etc.

માહિતી આપનારના કાર્ય વિશે વિગતવાર માહિતી આપો.

ઉદાહરણ તરીકે, જો તમે જો તમે ગામના કે સમુદાયના પૂજારીની મુલાકાત લઈ રહ્યા હોય કે જે માહિતી પૂરી પાડવાની પ્રક્રિયામાં સંકળાયેલ છે એટલે કે તમારા માટે માહિતીનો મુખ્ય સ્ત્રોત છે તો તમે તેમના વિશેની વિગતો બે થી ત્રણ વાક્યોમાં આ રીતે લખો – તેઓ જ્યાં કામ કરે છે તે ગામનું નામ, તેઓ કયા વર્ગ અથવા સમુદાય માટે કામ કરે છે (તેઓ બધા જ સમુદાયના લોકો માટે કાર્ય કરે છે અથવા કોઈ એક વિશિષ્ટ સમુદાય માટે કાર્ય કરે છે), તેઓ માહિતી પૂરી પાડવાની આ પ્રક્રિયામાં મહિના અથવા અઠવાડિયા માટે પોતાનો કેટલો સમય ફાળવે છે, વગેરે જેવી માહિતી, માહિતી આપનાર પાસેથી પ્રાપ્ત કરવી.

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## Case Report Form – Suicide Surveillance System Part 2

Intervention  Control

Month of incidence ..... Month of surveillance..... Month of storage.....

Study ID (Copy from the consent form):

સંમતિ પત્રકમાંથી કોપી કરો):

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Date: તારીખ:

D	D	M	M	Y	Y

Village name/ ગામનો નામ: .....

Taluka/તાલુકો: .....

Code of the Surveillance Officer/નિરીક્ષણ કરનાર અધિકારીનો કોડ: .....

**Note: નોંધ**

**Use separate form if more than one case of attempted suicide or suicide is reported.**

જો એક કરતાં વધુ આત્મહત્યાના પ્રયાસો અથવા આત્મહત્યા માટેના કેસ નોંધાયા હોય તો તે દરકે માટે એક અલગ કેસ રિપોર્ટ ફોર્મનો ઉપયોગ કરો અને તેમાં તેની સંપૂર્ણ વિગતો દર્શાવો.

**Information about the person who has attempted suicide or has died by committing suicide**

આત્મહત્યાનો પ્રયાસ કર્યો હોય અથવા આત્મહત્યા કરી હોય તેવા વ્યક્તિ વિશેની માહિતી

1. Name: \_\_\_\_\_

નામ

2. Age (years): ઉંમર(વર્ષ)

Known, specify, \_\_\_\_\_

ચોક્કસ જાણ છે, દર્શાવો

Unsure (specify range: \_\_\_\_\_)

ચોક્કસ નથી, સ્પષ્ટ કરો

Not known

જાણ નથી

**3. Gender:** Male Female Other  
જાતિ: પુરુષ સ્ત્રી અન્ય

**4. Religion: ધર્મ**  
Hindu હિન્દુ Muslim મુસ્લિમ Christian ક્રિશ્ચિયન  
Buddhist/Neo- Buddhist બૌદ્ધ Jain જૈન Sikh શીખ  
Jewish યહૂદી Parsi/Zoroastrianism પારસી  
Other, specify અન્ય, સ્પષ્ટ કરો: \_\_\_\_\_ No religion કોઈ ધર્મ નથી  
 Not known જાણતી નથી

**5. Caste: જ્ઞાતિ**  
 General/Open સામાન્ય/ઓપન  OBC અન્ય પછાત વર્ગ  
 Scheduled Caste અનુસુચિત જાતિ  Scheduled Tribe અનુસુચિત જનજાતિ  
 Nomadic Tribe વિચરતી જનજાતિ  Not known જાણ નથી  
 Not applicable લાગુ પડતું નથી  Other (Specify: \_\_\_\_\_)

**6. Marital Status: વૈવાહિક સ્થિતિ**  
 Unmarried અપરિણિત  Currently Married પરિણિત  
 Married but Gauna/Aanu not performed પરિણિત છે પણ “આણુ” કરવામાં નથી આવ્યું  
 Separated (no legal separation) ત્યજી દીધેલ  Divorced છુટાછેડા થયેલ  
 Widowed/Widower વિધવા/વિધુર  Status not known વૈવાહિક સ્થિતિની જાણ નથી

**7. Education: શિક્ષણ**  
 Known, specify/ જાણ છે, દર્શાવો \_\_\_\_\_  
 Not Sure/ Not known/ જાણ નથી / ચોક્કસ નથી \_\_\_\_\_

**8. Vaas code:** \_\_\_\_\_  
વાસકોડ  
If others (code 26), specify/ જો કોઈ અન્ય કોડ હોય તો તેને સ્પષ્ટ કરો: \_\_\_\_\_

**9. Employment Status (tick multiple options if applicable):**  
વ્યાવસાયિક સ્થિતિ( એક કરતાં વધારે (✓) નિશાની કરી શકાય)

<input type="checkbox"/> Student વિદ્યાર્થી	<input type="checkbox"/> Salaried person પગારદાર વ્યક્તિ	<input type="checkbox"/> Self-employed સ્વ-રોજગારી	<input type="checkbox"/> Housewife ગૃહિણી
<input type="checkbox"/> Daily wage earner દૈનિક વેતન કરનાર	<input type="checkbox"/> Unemployed બેરોજગાર	<input type="checkbox"/> Retired નિવૃત્ત	<input type="checkbox"/> Not known જાણ નથી
<input type="checkbox"/> Other; specify/ અન્ય; સ્પષ્ટ કરો _____			

**10. Date of attempt of suicide/suicide:**  
પોતાને હાનિ પહોચાડી હોય અથવા  
આત્મહત્યા કરી હોય તેની તારીખ:

D	D	M	M	Y	Y	Y	Y

If not known, tentative date (mention range): \_\_\_\_\_  
જો ચોક્કસ તારીખ યાદ ન હોય તો, આશરે તમને યાદ હોય તે તારીખ જણાવો

**11. Time of attempt of suicide/suicide:**  
પોતાને હાનિ પહોચાડી હોય અથવા આત્મહત્યાનો પ્રયત્ન કર્યો હોય તે સમય જણાવો:

Known, specify: \_\_\_\_\_  
જાણ છે, સ્પષ્ટ કરો

Not Sure, tentative time of the day: \_\_\_\_\_  
જો તે સમય વિશેની જાણ ન હોય તો આશરે સમય જણાવો

Not known  
જાણ નથી

**12. Method of attempt of suicide/suicide (tick one option only):**  
સ્વ-હાનિ પહોચાડવાની રીત/ આત્મહત્યાની રીત:

Drowning in waterbody પાણીમાં ડૂબીને

Fire/Self-immolation સ્વયંને આગ ચાંપીને

Hanging ગળાફાસો ખાઈને

Self-infliction of injury (e.g. with knife/firearm) સ્વયંમને ઇજા કરીને આત્મહત્યા કરવી (ઉ.દા. ચાકુ/બંદૂક વગેરે)

Jumping (e.g. from high-rise / building) ફૂટીને (ઉ.દા. ઊંચાઈ/બિલ્ડિંગ પાર્ટી વગેરે)

Overdose of medication દવાનું વધુ પ્રમાણ લઈને (જેમ કે વધુ ઊંઘની ગોળીઓ લઈને)

Self-electrocution વીજપ્રવાહ દ્વારા

Intentionally jumping in front of running vehicles/train ચાલુ વાહન અથવા ચાલુ ટ્રેનની વચ્ચે અડકેટમાં આવીને

Poisoning ઝેર

Known, specify/ જાણ છે, સ્પષ્ટ કરો \_\_\_\_\_

Not Sure/ ચોક્કસ નથી \_\_\_\_\_

Not known જાણ નથી

Other means; specify \_\_\_\_\_  
અન્ય; સ્પષ્ટ કરો

**Whether the person was under the influence of any substance when the incident occurred (e.g. alcohol or drugs)/ઘટના ઘટી તે સમયે વ્યક્તિએ કોઈ નશીલા માદક દ્રવ્યનું સેવન કરેલ હતું તે સ્પષ્ટ કરો (દા.ત. આલ્કોહોલ અથવા ડ્રગ્સ):**

Yes/ હા  No/ ના  Not known/ જાણ નથી

**13. Number of previous attempts (if known):** \_\_\_\_\_

અગાઉ કરેલ આત્મહત્યાના પ્રયત્નોની સંખ્યા (જો જાણતા હોય તો):

**14. Place of attempt of suicide/suicide (if known):**

સ્વયંમને હાનિ પહોચાડવાનો પ્રયત્ન કયો હોય તે જગ્યા (જો જાણતા હોય તો):

\_\_\_\_\_

**15. How long did it take for the attempt to be first discovered (if known)?**

આત્મહત્યાનો પ્રયત્ન કયો તે વિશેની જાણ કેટલા સમયગાળા દરમિયાન થઈ હતી (જો જાણતા હોય તો):

\_\_\_\_\_ Minutes / Hour / Days (mark whichever applicable)  
મિનિટો / કલાકો / દિવસો (લાગુ પડતી બાબત જણાવો)

**16. Was the person taken to the health care facility / professional:**

કોઈ પણ સારવાર પૂરી પાડવામાં આવી હતી:

A.  Yes  No  Not known  
હા ના જાણ નથી

If yes, - જો હા, તો પૂરી પાડવામાં આવેલ સારવારની પદ્ધતિ:

<input type="checkbox"/> for medical treatment તબીબી સારવાર પૂરી પાડવામાં આવી હતી	<input type="checkbox"/> for admission દવાખાનામાં દાખલ કરવામાં આવ્યા હતા
<input type="checkbox"/> for counselling પરામર્શ માટે મોકલવામાં આવ્યા હતા	<input type="checkbox"/> Not known જાણ નથી

B. Specify the facility / professional where the case was referred (public/private/NGO or trust):

વ્યક્તિને સારવાર માટે જ્યાં મોકલવામાં આવી હતી તે સંસ્થા કે વ્યાવસાયિક ડોક્ટરની વિગતો સ્પષ્ટ કરો  
(જાહેર / ખાનગી / એનજીઓ અથવા ટ્રસ્ટ):

\_\_\_\_\_

C. If admitted, number of days of hospitalization: \_\_\_\_\_  
જો વ્યક્તિને દવાખાનામાં દાખલ કરવામાં આવેલ હોય,

તો દાખલ થયેલ દિવસથી લઈને રજા આપવામાં  
આવેલ હોય તે દિવસ સુધીના કુલ દિવસોની સંખ્યા જણાવો.

**17. Outcome on discharge:** દવાખાનેથી રજા આપ્યા પછીનું પરિણામ:

- Survived from an attempt of suicide/ આત્મહત્યાના કરેલા પ્રયાસમાંથી સ્વાસ્થ્યની પુનઃપ્રાપ્તિ
- Referral to another critical care facility / વધુ દેખરેખ માટે અન્ય તજજ્ઞ પાસે મોકલ્યા
- Death/ મૃત્યુ
- Other, specify/ અન્ય, સ્પષ્ટ કરો \_\_\_\_\_
- Not known/ જાણ નથી
- Not applicable because person was brought dead  
લાગુ પડતું નથી કારણ કે, વ્યક્તિને મૃત અવસ્થામાં જ દવાખાને લાવવામાં આવેલ હતી
- Not applicable because person was not brought to the hospital.  
લાગુ પડતું નથી કારણ કે, વ્યક્તિને દવાખાને લાવવામાં આવેલ નથી

**18. Distance between the place of attempt of suicide or suicide and the nearest health center where the person was taken after the incident:**

આત્મહત્યા અથવા આત્મહત્યાનો પ્રયાસ કર્યો હોય તે સ્થળથી લઈને નજીકના આરોગ્ય કેન્દ્રના સ્થળે સુધીની અંતર કે જ્યાં આત્મહત્યા અથવા આત્મહત્યાનો પ્રયાસ કર્યો પછી વ્યક્તિને લઈ જવામાં આવી હતી

\_\_\_\_\_ kilometers/ કિલોમીટર

- Not known જાણ નથી
- Not applicable. લાગુ પડતું નથી.

**19. Informed to police:** બનાવ અંગે પોલીસને જાણ કરી હતી:

- Yes     No     Not known
- હા    ના    જાણ નથી

**20. Police record available:** પોલીસ પાસેથી રેકોર્ડ (માહિતી) પ્રાપ્ય છે

- Yes     No     Not known
- હા    ના    જાણ નથી

**Additional Notes:** નોંધ

\_\_\_\_\_

\_\_\_\_\_



## Annexure 2

## SPIRIT Suicide Surveillance System/–આત્મહત્યાના નિવારણ માટેની નિરીક્ષણ વ્યવસ્થા (સુસાઈડ સર્વેલન્સ સિસ્ટમ)

## Case Report Form for Hospitals (Attempted Suicide or Suicide)/ દવાખાનાં માટે કેસ રિપોર્ટ ફોર્મ (આત્મહત્યાના પ્રયાસો/આત્મહત્યા)

Name of Hospital/Clinic: /દવાખાનાંનું નામ.....

 Trust facility/ટ્રસ્ટ  Public facility/સરકારી  Private/ખાનગી

S No.	Date of Incidence ઘટનાની તારીખ	Name નામ	Age ઉંમર	Gender જાતિ	Village ગામનું નામ	Taluka તાલુકા	Method રીત	Attempted / completed suicide સ્વ-હાની/આત્મહત્યા	Additional Notes નોંધ

City/ શહેર- .....

Month of surveillance/ નિરીક્ષણ કરેલ માસ..... Year/વર્ષ.....

