Identification of the Correlates and Reasons for Death Registration in the Most Populous States of India using a mobile phone-based survey

Abstract:
Background: Although about 70 percent of deaths are registered in India, it varies widely betwenn 100 percent in the Mumbai district of Maharastra to 5% in Kurung Kumey district of Arunachal Pradesh.
Objective: The purpose of this study is twofold, a) to investigate the individual and household correlates of death registration, b) to analyze the reasons for registering deaths or the reasons for not registering deaths in the most populous states of India.
Data and Methods: Our study is based on mobile phone-based survey data primarily in the most populous states of India, viz., Uttar Pradesh, Rajasthan, Madhya Pradesh, Bihar, Chhattisgarh, Jharkhand, Uttarakhand with the lowest level of death registration
Findings: Males, adults aged 15-59 and accidental deaths have higher odds of death registration. 'Compliance of the law" was the foremost reason for registering deaths (50% of the registered deaths) whereas "receiving government benefits" was the second reason for registration.
Conclusion: The study findings provide crucial methodological input to upgrade survey questions on death registration in large-scale surveys such as DHS or MICS in low and middle-income countries. Our study findings also argue that mobile phone-based survey findings, despite their limitations, can give meaningful insight into death registration status with limited resources and relatively in a short period. Finally, our study findings reveal an in-depth understanding of the reasons for registering or not registering deaths, which are significant for policy measures to improve death registration.

Keywords: India; Death Registration; Mobile Phone Based Survey; Correlates; Civil Registration System

Introduction

There is no alternative to Civil Registration System for producing robust mortality at national, state, and local levels and by socio-economic characteristics. Despite having multiple demographic datasets such as the Sample Registration System, National Family Health Survey, and Health Management Information System, there are several challenges in estimating mortality rates at the district level or by socioeconomic characteristics (Saikia and Kulkarni 2016). According to National Family Health Survey 2019-21, about 70 percent of deaths in India are registered, yet the

death registration among females varies from 100 percent in the Mumbai district of Maharastra to 5% in Kurung Kumey district of Arunachal Pradesh. The lack of a complete civil registration system also sparked debates over the number of excess deaths in India due Covid.

A review of the literature on death registration in India reveals that most studies critically analyzed the completeness of death registration in Civil Registration System (CRS) with respect to time and space (Rao and Gupta, 2020; Gupta et al 2016; Mahapatra and Rao 2001; Kumar et al 2019; Basu and Adir 2021; Rao et al 2021; Singh et al 2012). Some of these studies reviewed the system of CRS, which hinders the death registration process. Some other studies evaluated the quality of mortality measures based on the Civil Registration System of India. These studies conclude that death registration in India has improved over time but varies greatly across states, age, and sex of the deceased persons. Using nationally representative data, Saikia et al (2023) found that nationally, 70.8% of deaths were registered. The likelihood of death registration was significantly lower for females than males; increased significantly with the age of the deceased person; and was less likely among rural households, disadvantaged castes, the poorest wealth quintile, Muslims, and households without a below-poverty level card. Two primary survey-based studies assessed Civil Registration System (Rane et al 2020; Kumar et al 2022) in Assam and Bihar. Kumar et al documented that death registration was lower among children and female adults due to a lack of financial or property-related benefits. Both studies found that most participants faced challenges in reporting birth and death due to poor delivery of services at the registration centers, higher indirect opportunity cost, and demand of bribes by the CRS staff for providing certificates. The reason for poor utilization includes difficult communication, lack of awareness, an inefficient system, higher indirect cost, a lack of adequate investment, shortage of dedicated staff, and poor infrastructure with limited computer and internet services at the registration (Rane et al 2020; Kumar et al 2022).

However, these primary survey-based studies interviewed very few individuals in a small area who experienced death in their households. In addition, information on deceased persons or their households was nearly absent in the above-mentioned studies. None of these studies are based on mobile phone-based surveys. To our knowledge, no previous studies documented reasons for death registration using quantitative survey methods covering multiple states of India.

Against this backdrop, the purpose of this study is twofold, a) to investigate the individual and household correlates of death registration, b) to analyze the reasons for registering deaths or the reasons for not registering deaths in the most populous states of India. Our study is based on mobile phone-based survey data primarily in the most populous states of India, viz., Uttar Pradesh, Rajasthan, Madhya Pradesh, Bihar, Chhattisgarh, Jharkhand, Uttarakhand with the lowest level of death registration. Our study extends the previous knowledge on correlates of death registration with additional information on the deceased as well as their households. We also analyzed the reasons for registering or not registering the death with the civil authority.

The study findings provide crucial methodological input to upgrade survey questions on death registration in large-scale surveys such as DHS or MICS in low and middle-income countries. Our study findings also argue that mobile phone-based survey findings, despite their limitations, can give meaningful insight into death registration status with limited resources and relatively in a short period. Finally, our study findings reveal an in-depth understanding of the reasons for registering or not registering deaths, which are significant for policy measures to improve death registration.

Data and Methods

Results

Table 1 and figure 1 presents the sample description of the deaths in the study area. Our sample consists of 357 deaths, out of which 63% were males. Most of the deaths were from of age 15 and above (total 87%) and from rural areas (61%). While deaths are distributed widely across four caste groups, about 23% of deceased caste identity was unknown. Most of the deaths were of Hindu background (69%) and without schooling (45%). While only 36% of the deaths occurred at the health facility, the majority of them (79%) were non-accidental deaths. Table 1 also presents the percentage of death registration by the background characteristics of the deceased persons. In general, death registration is higher among males compared to females. It is the highest among adult age groups 15-59 years, increases with increasing age of the dead individual. Hindus and

other religious individuals have higher level of death registration compared to the Muslims. Figure 1 shows that majority of the deaths were shared from Uttar Pradesh, followed by Rajasthan and Madhya Pradesh whereas Delhi, Uttarakhand and Other stated shared the lowest number of reported deaths.

Table 1: Sample description of the deaths in the study area, month/year, India

Characteristic	**Total deaths, no.**[1] , % share out of total sample	**Deaths registered, no.(%)**[2]	**p-value**[3]
Gender of deceased			0.035
Female	131 (37%)	65 (50%)	
Male	226 (63%)	138 (61%)	
Age at death			<0.001
0-14y	30 (8%)	6 (20%)	
15-59y	158 (44%)	109 (69%)	
60y & older	155 (43%)	84 (54%)	
Unknown	14 (4%)	4 (29%)	
Residence			0.984
Peri-urban	22 (6%)	13 (59%)	
Rural	217 (61%)	126 (58%)	
Urban	70 (20%)	40 (57%)	
Unknown	48 (13%)	24 (51%)	
Caste			0.829
General	81 (23%)	46 (57%)	
Other backward castes	103 (29%)	58 (56%)	
Scheduled caste	36 (10%)	20 (56%)	
Scheduled tribe	52 (15%)	33 (63%)	
Unknown	85 (23%)	46 (54%)	
Religion			0.113
Hindu	248 (69%)	147 (59%)	

Characteristic	Total deaths, no.[1], % share out of total sample	Deaths registered, no.(%)[2]	p-value[3]
Muslim	33 (9%)	15 (45%)	
Other religion	3 (1%)	3 (100%)	
Unknown	73 (20%)	38 (52%)	
Schooling of deceased			0.205
No schooling	160 (45%)	88 (55%)	
Primary	44 (12%)	23 (52%)	
Secondary	81 (23%)	52 (64%)	
University and higher	31 (8.7%)	22 (71%)	
Unknown	41 (12%)	18 (44%)	
Place of death			0.337
At health facility	128 (36%)	79 (62%)	
Elsewhere	197 (55%)	111 (56%)	
Unknown	32 (9%)	13 (41%)	
Circumstances of death			0.832
Accidental	44 (12%)	25 (57%)	
Not accidental	282 (79%)	165 (59%)	
Unknown	31 (8.7%)	13 (42%)	

[1]n=total size; [2]n (%);[3]Pearson's Chi-squared test; Fisher's exact test

Figure 1: State-level distribution of the reported deaths in the study area, month, year, India

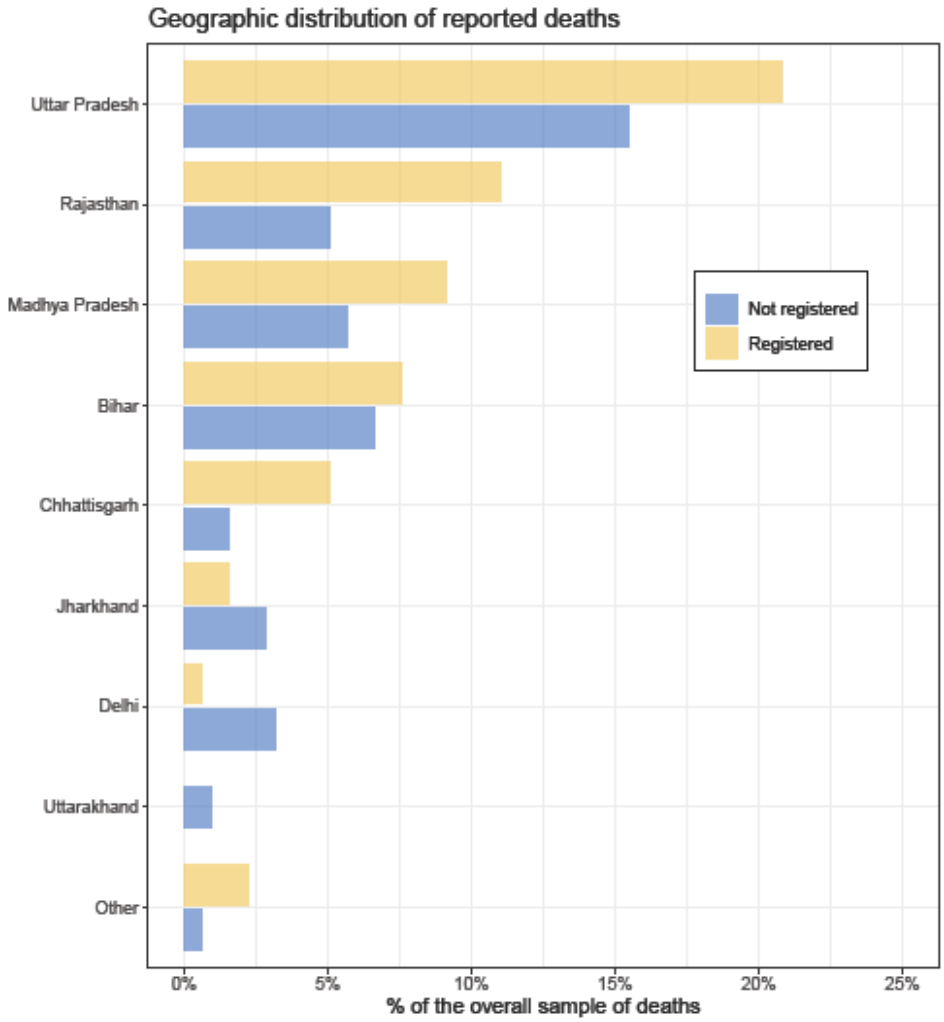


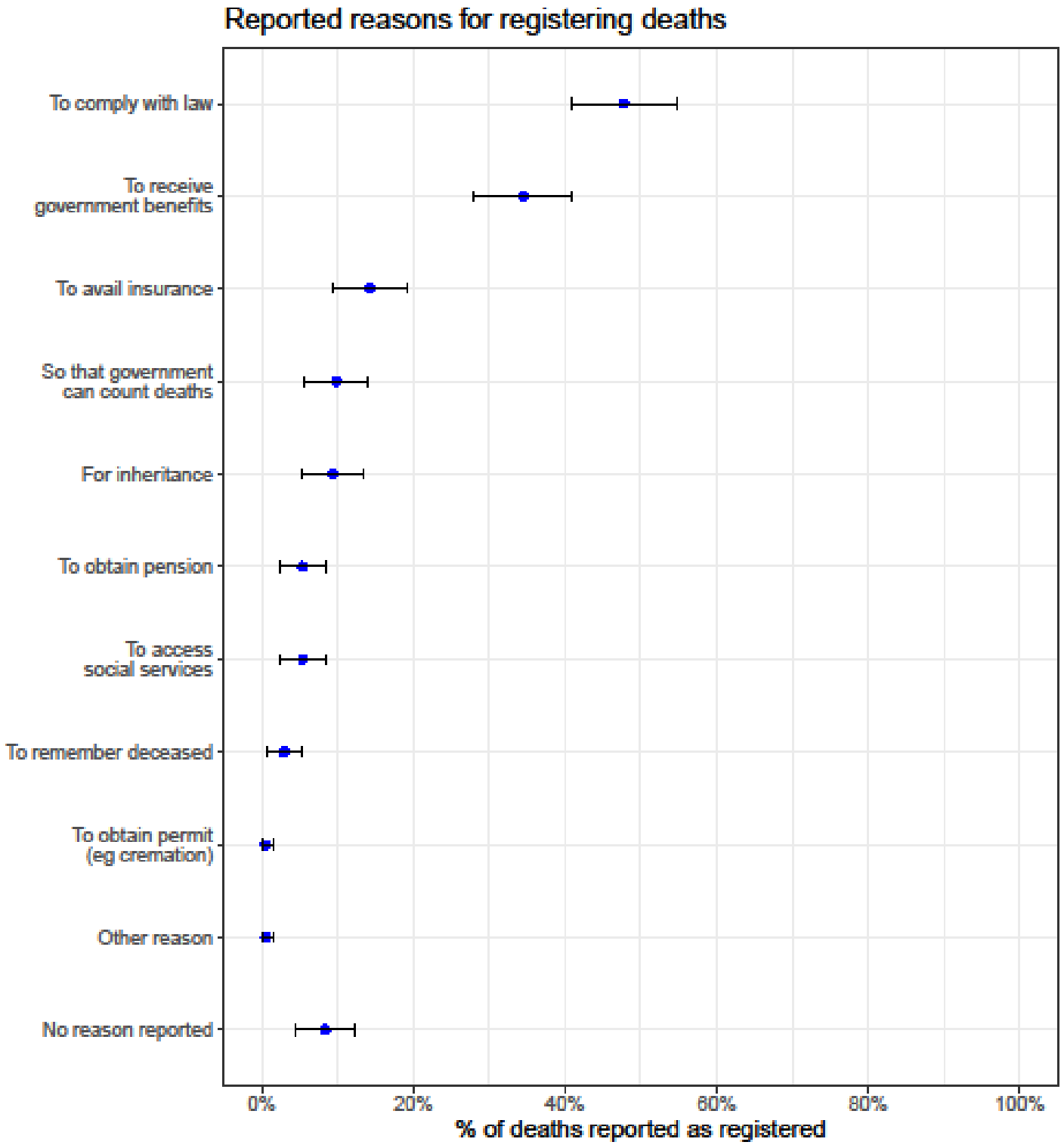
Table 1 presents the results of the logistic regression on correlates of death registration in the study area.

Table 2: Results of logistic regression of death registration, study area, month, year, India

Characteristic	OR[1]	95% CI[1]	p-value
Gender of deceased			
Female	—	—	
Male	1.51	0.91, 2.51	0.113
Age at death			
0-14y	—	—	
15-59y	11.2	3.98, 35.9	<0.001
60y & older	5.94	2.20, 18.2	<0.001
Schooling of deceased			
No schooling	—	—	
Primary	0.64	0.31, 1.31	0.221
Secondary	0.85	0.44, 1.61	0.608
University and higher	1.15	0.47, 2.98	0.760
Place of death			
At health facility	—	—	
Elsewhere	0.54	0.31, 0.91	0.024
Circumstances of death			
Accidental	—	—	
Not accidental	1.66	0.82, 3.35	0.156

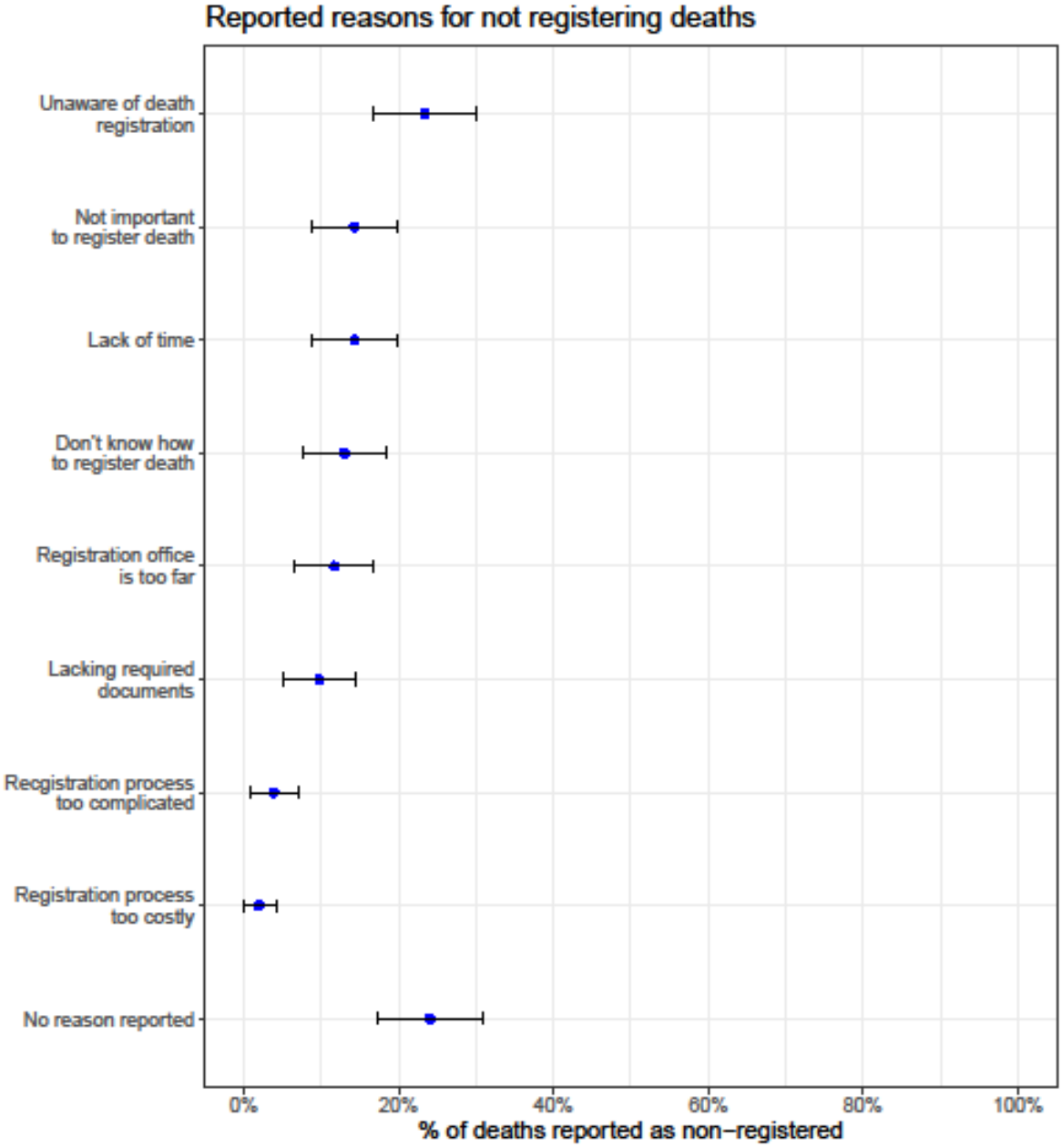
[1]OR = Odds Ratio, CI = Confidence Interval

Figure 2: reasons for registering



- Panel a: overall
- Panel b: by gender
- Panel c: by age
- Panel d: by education

Figure 3: reasons for not registering



- Panel a: overall
- Panel b: by gender
- Panel c: by age
- Panel d: by education

Discussion and conclusion

Previous studies on death registration in India focused on coverage and quality analysis of CRS reports (Ref) as well as the qualitative context of the low coverage of death registration at the local level (Kumar, Saikia, and Diamondsmith 2022). To our knowledge, this is the first study examines the correlates and reasons for death registration in the most populous states of India using a mobile phone-based survey in India. The major advantages of mobile phone-based surveys are better representation within the sample, faster completion, and lower cost of conducting the survey. Interestingly, most of the findings of mobile phone surveys are consistent with those of household surveys.

Another crucial inference from our study is that adding questions to a sample survey, particularly a large-scale sample survey can yield results, which can be used to improve death registration in low and middle-income countries. Such surveys can provide an exact duration of the estimates for each question. In our study, the total amount spent on the questions on death registration was xxx minutes.

The study has a few limitations. First, our study is based on mobile phone surveys, particularly using the sampling frame of one mobile network. It may lead to the selection of certain groups of the population. For example, we found that there is no difference in the death registration percentage between rural and urban residents. However, findings from the large-scale survey show that death registration is lower among rural households. Also, our study is primarily based on the north-central states of India. The other low-performing states in death registration from the North-East and high-performing states from southern India are not included in our study. Therefore, the findings of our results are valid in the study area only. Secondly, while a mobile phone-based survey has a number of advantages, it may lead to a large share of missing information. In our study, there was about 12.8% missing information due to fear of identification state. Some information of the deceased person say, religion and caste were missing between 20% to 23% sample.

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Appendix

Appendix 1: Sample description of the respondents 2500

Appendix 2: Missing table on death registration

Characteristic	Total deaths, no.[1]	Non-missing data, no.(%)[2]	p-value[3]
Residence			0.756
Peri-urban	24	22 (92%)	
Rural	240	217 (90%)	
Urban	80	70 (88%)	
Unknown	63	48	
Caste			0.491
General	86	81 (94%)	
Other backward caste	117	103 (88%)	
Scheduled caste	41	36 (88%)	
Scheduled tribe	58	52 (90%)	
Unknown	105	85	
Religion			0.428
Hindu	274	248 (91%)	
Muslim	37	33 (89%)	
Other religion	4	3 (75%)	

Characteristic	Total deaths, no.[1]	Non-missing data, no.(%)[2]	p-value[3]
Unknown	92	73	
Gender of deceased			0.070
Female	156	131 (84%)	
Male	251	226 (90%)	
Age at death			0.508
0-14y	31	30 (97%)	
15-59y	174	158 (91%)	
60y & older	173	155 (90%)	
Unknown	29	14	
Schooling of deceased			0.992
No schooling	179	160 (89%)	
Primary	49	44 (90%)	
Secondary	89	81 (91%)	
University and higher	34	31 (91%)	
Unknown	56	41	
Place of death			0.992
At health facility	143	128 (90%)	
Elsewhere	220	197 (90%)	
Unknown	44	32	
Circumstances of death			0.609
Accidental	48	44 (92%)	
Not accidental	316	282 (89%)	
Unknown	43	31	

[1]n

Characteristic	Total deaths, no.[1]	Non-missing data, no.(%)[2]	p-value[3]

[2]n (%)

[3]Fisher's exact test; Pearson's Chi-squared test