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The Epidemiology of Suicides: Findings from Fifteen Rural Health Centers of Gonoshasthaya Kendra (GK), in Bangladesh

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Abstract

Introduction: *Globally suicide is a public health concern. The situation is worst in the South Asian Region, including Bangladesh. There is limited longitudinal information available to know the epidemiology of suicides in Bangladesh. Considering the importance of the issue, GK has collected continuous information on suicides and its associated factors.*

Methodology: *The suicide related data were collected for six years (2017 through 2022) from 120 villages under fifteen rural health centers of GK, encompassing 3,48,910 populations spreading over 10 districts of Bangladesh. Trained health workers, who are closely attached with the community, collected the information.*

Results: *Overall 10 suicides were committed per 100,000 populations in each year. No significant percentage difference was found between male and female suicides. Seventy five percent of suicides occurred below the age of 40 years, 53 % had low or no education, 65. 6% were married. About 70% of suicide occurred altogether among home-makers, students and day-labors. Family problems and personal nonfulfillment were the main causes, hanging and ingestion of poisons were the principal mode of suicides which mostly occurred at home during winter and rainy seasons.*

Conclusion: *Younger age groups, both male and female, married, having low educational attainment, engaged in hard work, homemakers and students will be targeted first for any suicide prevention strategy. Families should be involved for identification of Suicidal behavior and preventing subsequent execution of actual suicidal act. Community awareness, institutional education, mass campaign could be arranged for the concerned. Criminal accusation for the family could be logically relaxed. Weapon used during suicide should be restricted to target populations. National suicidal surveillance system with adequate information should be established.*

Keywords: *Suicide, Suicidal behavior, deaths, hanging, poison, accident*

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Introduction

Suicide is a public health concern worldwide. In 2019, more than 700, 000 people lost their lives globally and more than one suicide was committed per 100 deaths(1). It has been suggested to reduce suicide as an indicator for mental health in the United Nations Sustainable Development Goals (SDGs) (2). Though a significant decreasing rates of suicides have been found most of the countries in Europe, America and the East Asian region, the condition of South Asian Region is the opposite (3). There is little concern about the suicide issue in Bangladesh. Also there is no national level suicide database or any existing suicide surveillance system or implementation of any prevention strategy here (4).

The rate of suicides varies between studies and also with the suicide data of World Health Organization (WHO). According to the WHO report of 2014, the worldwide suicide rate in 2012 was 7.8 per 100, 000 population (4). On the other hand, in a Bangladeshi study, the rate of suicide, were 8.7 and 6.8 per 100, 000 population for female and male respectively in 2012 (4). In a WHO publication of 2021, mentioned that the rate of suicide in Bangladesh in 2020 was 3.85 per 100, 00 population (1). Too high suicide rate (128.8 per 100,000 populations per year) was also found in one community based study in Bangladesh (5). Underestimation of reporting may easily be happened in Bangladesh as suicide is a criminal offence and people feel hesitant to let the event be informed to the legal system (6, 7). Due to the variability of suicide rates in Bangladesh, a national representative data-set linked with surveillance system is urgently demanded for policy making and specific intervention.

Suicide is a multifactorial interplay within them who cherish the ambivalent behavior for wanting to die as an impulsive response to acute stressors. The factors may be psychological, mental, societal, cultural, financial, solitariness, individual conflict, substance abuse, chronic illness etc.(2). Due to multifactorial causality and variability of the place of occurrence, wide geographical area and larger population size is required to comment on any epidemiological measure.

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There are few articles, perhaps none in Bangladesh based on long time prospective primary data to measure the magnitudes and causes related to suicide. Moreover, those were conducted in small geographical area. We have got ample opportunity in this study to follow-up more than 300, 000 populations (who have been residing within ten districts) to collect suicide related information for long six years. Our prospective study aims to investigate the epidemiology of suicides among these widely distributed population.

Methodology

Data collection period:

The suicide related data were collected for long six years from January, 2017 to December, 2022.

Study area and Populations:

Data were collected in 15 GK's health centres located within 120 villages under 10 separate districts of Bangladesh, encompassing 3,48,910 populations (Male-1,78,497 and female-1,70,413) in catchment areas.

Geographical and climatic diversity of study areas:

The data collection areas are distantly located and few are also in climatic vulnerable zone, such as charfassion and Cox's Bazar

Data collection and data entry:

In these centres, there have been follow-up of death, birth, pregnancy related events, Noncommunicable diseases (NCDs) surveillance and collection of any time-demanded cross-cutting information, like COVID-19 etc. The rural GK health centers are well equipped with trained health workers (HWs) for providing at least primary level clinical services in its own facilities and also to provide domiciliary services for the community people. In village level, there are traditional birth attendants and community level volunteers. When any event of suicide happens, they then pass the information to the HWs. Any suicide related information from the catchment were being collected as early as possible by the HWs through a structured questionnaire. The HWs collect the information on suicide and other vital events. A percentage of the suicidal events were cross-checked by the supervisors. Then the final data were sent to the Centre for Community Health and Research (CCHR) at Savar, Dhaka, where all information

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were entered into central database. Suicide related data were extracted from central database for analysis.

Data analysis:

The data were analyzed using SPSS IBM Statistic, Version-23 software. Descriptive statistics such as frequency, percentage and Chi-square (Fisher's Exact Test where necessary) were calculated.

Ethical issues:

All the clinical activities and routine information collection works in respective study areas have been approved by the government of Bangladesh.

Results:

Total 209 suicides happened in six years. Table 1 shows that male suicidal death is slightly higher than that of female (50.7% male and 49.3% female) and there is no significant gender difference between different age groups. About 75 % suicides were committed below the age of 40 years. Of those 63% was below 30 years and 30% was below the age of 19 years. No specific increase or decrease trends of suicide is found as the level of education advances, but less events are seen in the highest educated group irrespective of gender (17.0% in male and 12.6% in female). Those who committed suicide were more married than unmarried (65.6% married and 34.4% unmarried) though difference is not statistically significant (p-0.145). Those who died, mostly are home-makers, day labours and students (27.8%, 18.7% and 23.4% respectively) and they are from poor and medium socio-economic status (64.6% and 29.2% respectively).

Table 2 demonstrate the distribution of suicide cases, catchment area population and the rate of suicides per 100, 000 population/year. The three highest suicide occurring areas are har, Shimulia, Barobaria (28.6, 16.4 and 15.7 deaths/ 100000 population/year respectively in highest to lowest order). Alternatively, the three low suicide occurring areas are Charfassion, Panishail and Sreepur (3.1, 4.8 and 6.3 deaths/ 100000 population/year respectively in lowest to highest order). The overall rate of suicide is 10.0 /100,000 population per year.

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Table 1: Background characteristics of the suicide cases (n=209)

Characteristics	Male		Female		Total		p-value (Chi-square)
	Freq.	%	Freq.	%	Freq.	%	
Gender	106	50.70%	103	49.30%	209	100	
Age Group (in years)							
12-19	29	27.4	34	33.0	63	30.1	
20-29	34	32.1	35	34.0	69	33.0	
30-39	11	10.4	13	12.6	24	11.5	**0.584**
40-49	19	17.9	12	11.7	31	14.8	
< 49	13	12.2	9	8.7	22	10.5	
Mean age (mean± SD)	**30.77±14.08**		**27.53±13.34**		**29.18±13.78**		
Educational Qualification							
No formal education	28	26.4	26	25.2	54	25.8	
Primary	24	22.6	33	32.0	57	27.3	**0.452**
Secondary	36	34.0	31	30.1	67	32.1	
Above Secondary	18	17.0	13	12.6	31	14.8	
Marital status							
Unmarried	42	39.6	30	29.1	72	34.4	**0.145**
Married	64	60.4	73	70.9	137	65.6	
Occupation							
Business	8	7.5	0	0.0	8	3.8	
Home maker	0	0.0	58	56.3	58	27.8	
No work	12	11.3	6	5.8	18	8.6	**0.000***
Day labour	38	35.8	1	1.0	39	18.7	
Service	28	26.4	9	8.7	37	17.7	
Student	20	18.9	29	28.2	49	23.4	
Socio-economic status							
Very poor	0	0.0	0	0.0	0	0.0	
Poor	75	70.8	60	58.3	135	64.6	
Medium	22	20.8	39	37.9	61	29.2	**0.02***
Rich	8	7.5	4	4.0	12	5.7	
Very rich	1	0.9	0	0.0	1	0.5	

***Fisher's Exact Test (p-value)

Table 3 shows the differences of the background characteristics between high suicide area and low suicide area. To get some more quantity in each of the two groups, one "high event area" was generated by joining the data of all three highest suicide occurring areas (Jarun,

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Shimulia, Barobaria). Similarly, another "low event area" was created by joining the data of all three lowest occurring areas (Charfassion, Panishail and Sreepur). No significant differences of background characteristics have been observed between "low event area" and "high event area".

Table 2: Centre-wise distribution of suicide cases, catchment area population and the rate of suicide per 100,000 population/ year.

Name of the centres	District	Suicide cases (in 6 years)			Working area population			Suicide /100000 population/ year
		Male	Female	Total	Male	Female	Total	
Saturia	Manikgonj	3	2	5	3466	3424	6890	12.1
Barobaria	Manikgonj	5	8	13	7344	6429	13773	15.7
Shimulia	Dhaka	1	8	9	4575	4590	9165	16.4
Pathalia	Dhaka	2	5	7	7964	8545	16509	7.1
Dhamshona	Dhaka	9	14	23	23957	23935	47892	8.0
Panishail	Gazipur	1	5	6	9600	11057	20657	4.8
Jarun	Gazipur	38	24	62	18124	17969	36093	28.6
Sreepur	Gazipur	11	9	20	28439	24546	52985	6.3
Vaatshala	Sherpur	11	2	13	16753	14947	31700	6.8
Parbotipur	Dinajpur	1	2	3	3672	3368	7040	7.1
Kashinathpur	Pabna	4	11	15	13183	13051	26234	9.5
Sirajgonj	Sirajgonj	8	6	14	11941	10461	22402	10.4
Sonagaji	Feni	6	2	8	6075	6645	12720	10.5
Charfassion	Bhola	2	5	7	19494	17975	37469	3.1
Cox's Bazar	Cox's Bazar	4	0	4	3910	3471	7381	9.0
Total/ Average		**106**	**103**	**209**	**178497**	**170413**	**348910**	**10.0**

Figure 1 depicts that the two main reasons for committing suicide are 'family problems' and 'personal nonfulfillment' in life. The difference of cause of suicide between male and female is not significant (p=0.184, not shown). Family problems in male and female were 73.6% and 87.4% respectively. Personal nonfulfillment among the male and female suicide cases were 11.3% and 6.8% respectively. 'Hanging to death' and 'ingesting poison' are the main modes of suicide, irrespective of male and female. The overall percentage of hanging are 75.1% (male 70.8% and female 79.6%) and using poison are 22.5% (male 27.4 % and female 17.5%) in Figure 2. 81.8% suicides were committed in their own houses, 14.8% was in hospital or on the way to hospital and the rest 3.4% was held in other places, not in their homes (Figure-3).

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We checked the seasonality of suicides in our study. According to Banglapedia, three distinct seasons have been considered in Bangladesh for a year and we found another study using similar seasonal category. The seasons are i) hot season (March to May) ii) rainy season (June to October) and cool, dry winter season (8, 9) . We found higher suicide cases during rainy season (38%) and cool, dry winter season (37.3%). On the other hand, comparatively low suicides (24.4%) were found in hot season (data not shown).

Table 3: Background characteristic of low event areas (collectively three areas with the lowest rate of suicides) and high event areas (collectively three areas with the highest rate of suicide)

	Low event areas		High event areas		Total		p-value
	Number	%	Number	%	Number	%	
Suicide cases	33	28.2%	84	71.8%	117	100%	
Male	14	42.4%	44	52.4%	58	49.6%	0.412
Female	19	57.6%	40	47.6%	59	50.4%	
>19 years	10	30.3%	19	22.6%	29	24.8%	
20-29 years	11	33.3%	32	38.1%	43	36.8%	
30-39 years	6	18.2%	7	8.3%	13	11.1%	0.307
40-49 years	4	12.1%	12	14.3%	16	13.7%	
>49 years	2	6.1%	14	16.7%	16	13.7%	
No education	4	12.1%	30	35.7%	34	29.1%	
Primary	14	42.4%	14	16.7%	28	23.9%	
Secondary	13	39.4%	22	26.2%	35	29.9%	0.001
Above secondary	2	6.1%	18	21.4%	20	17.1%	
Unmarried	12	36.4%	21	25.0%	33	28.2%	0.219
Married	21	63.6%	63	75.0%	84	71.8%	
Business	2	6.1%	6	7.1%	8	6.8%	0.564*
Home maker	11	33.3%	23	27.4%	34	29.1%	

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No work	1	3.0%	9	10.7%	10	8.5%	
Day labour	6	18.2%	12	14.3%	18	15.4%	
Service	6	18.2%	23	27.4%	29	24.8%	
Student	7	21.2%	11	13.1%	18	15.4%	
Very poor	24	72.7%	54	64.3%	78	66.7%	0.826*
Poor	7	21.2%	21	25.0%	28	23.9%	
Medium	2	6.1%	8	9.5%	10	8.5%	
Rich	0	0.0%	1	1.2%	1	.9%	

*Fisher's Exact Test (p-value)

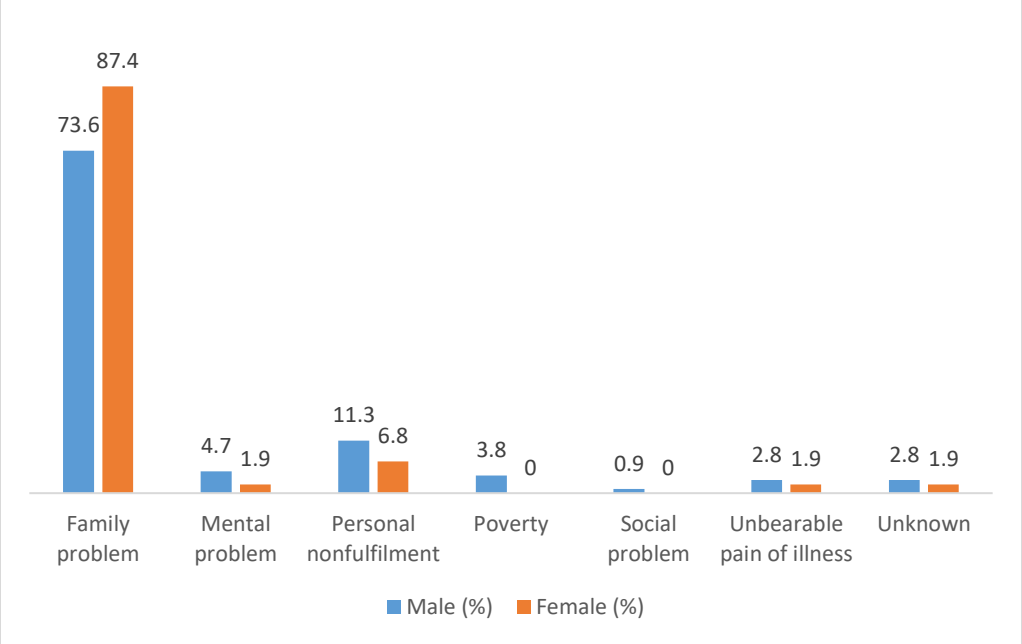

Figure 1: Causes of suicide between male and female

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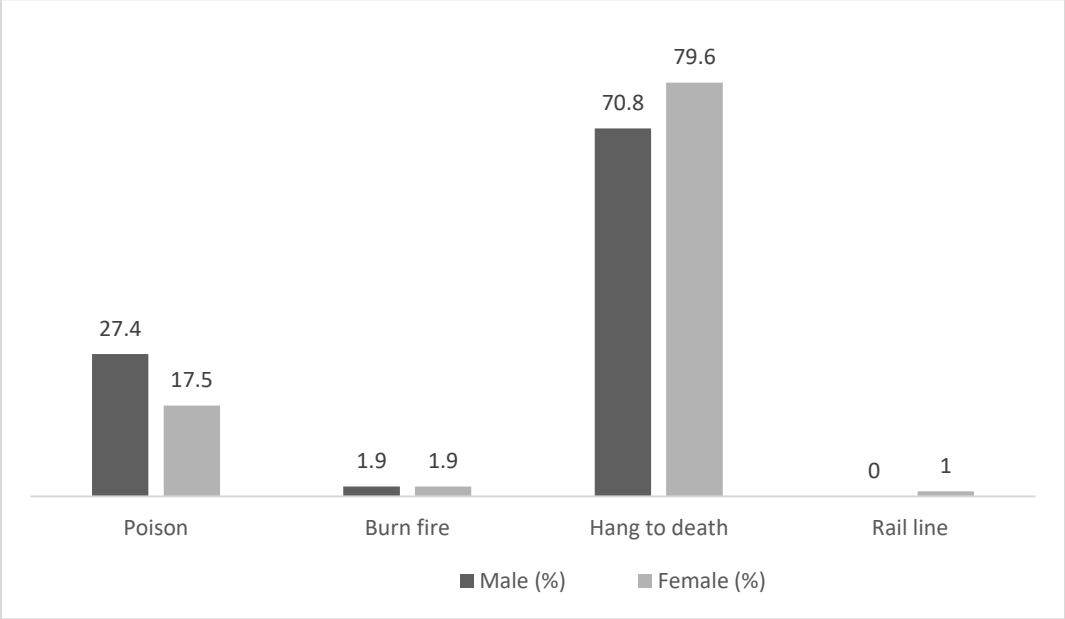

Figure 2: Modes of suicide between male and female

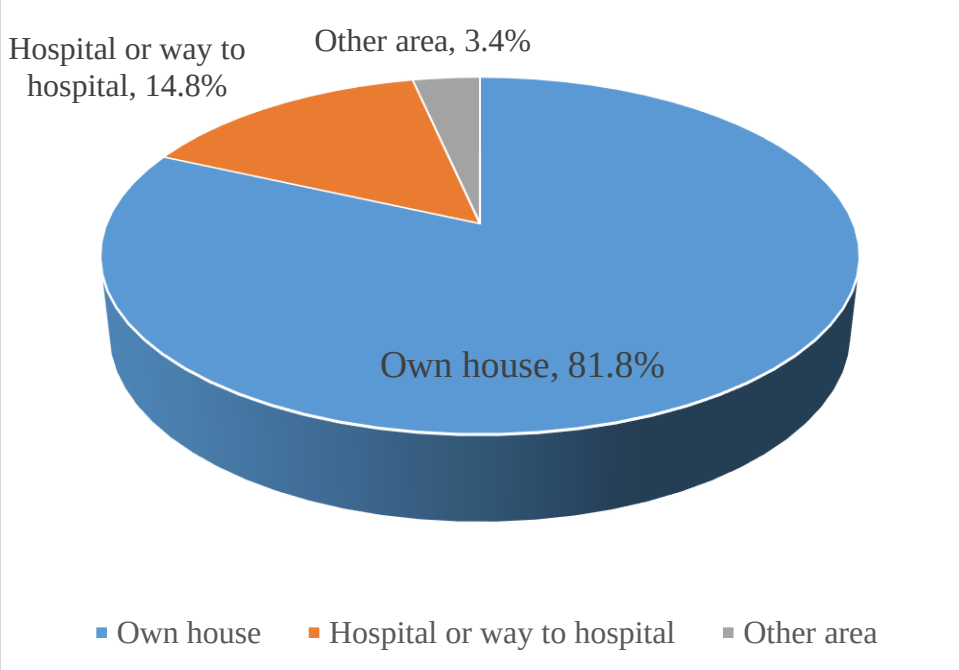

Figure 3: Showing the places of suicides

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Discussion

In our study, the overall percentage of male was little higher than female (50.7% male and 49.3% female) among those who committed suicide (table 1). But if we check the centre-wise percentage of suicide separately (data not shown), eight centres out of fifteen showed female predominance. Several studies in Bangladesh showed different results for gender distribution. In a study from post mortem examination of 334 suicide cases showed that 69.2 % were male (10). A study based on newspaper reporting on suicide from November 2016 to April 2017 found that 58% suiciders were female (11). Another study found 82% are female (12). Whatever may be result, both male and female should equally be targeted during any intervention.

We found in our study that, 30%, 63%, and 75% of suicide were committed below the ages of 19, 30 and 40 years respectively (table 1). A study in Bangladesh showed that 61% suicide happened below 30 years of age (11). Suicidal behavior (suicidal ideation, suicidal plan and suicidal attempts) starts from school-going days and subsequently the execution of suicide happens. A Global School-based Student Health Survey (GSHS) of WHO showed that the rate of suicidal behavior among Bangladeshi school-aged children was 8.8% (13).

As the result of our study is consistent with that of other studies, the adolescents or early aged groups should be targeted for preventing development of suicidal behavior and thereby reducing execution of the real act, that is suicide in future. Complex individual, familial, societal, financial and other factors interplay developing behaviour. It is always challenging to change behavior. Yet appropriate strategy should be developed and implemented targeting younger section of population, who will grow as older in future. In our study, 53% suicide cases had primary education or no education and 17.1% with above secondary education (table 1). A Bangladeshi study showed that, less than 7% suiciders had higher secondary education or above (14). It is likely that low education level might have less chance of interaction with diversified social environment and develop reasoning against suicide and vice versa. Special attention should be given for less educated groups.

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We found that more than 65% suisiders are married. Though globally unmarried die more but in Bangladesh, the scenario is opposite (4, 14, 15). In Bangladesh, every people has to bear additional responsibilities for the families after marriage. Some can manage the situation and some can't. Those who can't, are likely to be fallen into depression, Depression causes suicidal behavior and finally suicide happens. In joint families, the earning members usually support other family members, thus the adverse situation in family is managed. Now a days the joint families are breaking into multiple and thus burden and stress particularly on married person is gradually increasing. Moreover, the female members usually come to father-in-laws houses after marriage, which is completely a new home for her. There needs adjustment and compromise. The new home and the behavior of new family members gradually may be unbearable to them, making psychologically upset and losing their lives by suicides.

In our study, it is found that the percentage of home makers, students and day-labours are maximum among the suiciders and most of the suicide cases are from poor families (table 1). A hospital based study in Bangladesh showed consistent result with ours, that homemakers, farmers and students are more among who committed suicide (16). Homemakers, students, and day-labors usually do not have enough financial ability and likely to be engaged in huge work and stress for those. Those may drive them for suicide. Moreover, the students are emotional and often involve in love affairs, which is not acceptable by their families most of the time and ultimately the disappointed students commit suicides.

We found that 10 suicides occurred/ 100, 000 populations per year (table2). Another study conducted in Bangladesh during 2003 showed that the overall suicide rate was 7.3/ 100, 000 populations per year (14). The later was conducted in urban-rural setting. Which we got from our study, a well ahead of fourteen years of that study, is supposed to be consistent with the result of other study. Because, the predictors are still increasingly prevailing in Bangladesh and any preventive action hardly evident.

We hardly find any special differences beyond the background characteristics (table 3), like geography, income source etc. between "low event area" and "high event area". Among high suicide prone centres, lot of industries are seen in Jarun. But Simulia and Barobaria are mostly

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rural. On the other hand, in low event areas, Charfassion is coastal, panishail is mixed with industries and countrysides and Sreepur is mostly rural. It may be hypothesized that some other factors (s) except those background characteristics could play a role for suicide. One review paper mentioned that previous suicidal attempt is considered as one of the most important predictors of committing suicide. (17).

Broadly family problems and personal nonfulfilment were the main causes of death irrespective of gender (figure 1). The main family problems included oppression by family members; quarrel with husbands, wives, mother-in-laws, parents and other family members; extramarital affairs identified by families and second marriage of husbands. The sense of personal nonfulfilment, which compelled one to commit suicide, developed mostly from fail in love and unsuccessful in examination (data not shown). Whatever may be the causes of suicide, a positive interplay between individuals and families is must to prevent it. Hiding and non-responsiveness by the family members about the probability of ensuing events may aggravate the situation. So, at least for a clinical intervention, the patients and the family members to be involved to develop a safety plan (18).

Hanging and ingestion of poison were the two main modes of suicide, same in male and female (figure 2). More than 70% suicides were committed by hanging among all age categories except those who were more than 49 years of age (data not shown). May be, older people think hanging difficult as it requires physical strength, such as climbing etc. There is another study in Bangladesh which showed that hanging and poisoning were the main ways for suicide (19).

It is found in our study that maximum suicides occurred in one's own home. So, it is necessary to keep the household in watch by the family members particularly for those who previously attempted for suicide or for those who are at risk of suicide there.

Higher percentage (75.6%) of suicide events occurred comparatively in cool weather (rainy season and winter combined) and lower suicides (24.4%) were found in hot season. Anybody may feel restlessness in hot weather due to excessive heat and get little time to think

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about suicide. On the other hand, it is possible to spend some comfortable moments for planning for suicide in soothing cool weather during winter or rainy season.

Limitations of the study:

There were some limitations or challenges during implementation the study. The affected families have tendencies to hide all information related to suicide. Deaths were not coded according to WHO International Classification of Diseases (ICD), but one of our supervisors confirmed the deaths as suicides and cross-checked the other death related information. The strength of the factors (though information on small number of factors are collected in this study), which contributed to happen highest rates of suicide in highest event area or to reduce the rates in lowest events area could have been tested or compared by regression analysis. Due to inadequate number of cases, particularly within of low happening area, that had not been executed. Data were not collected on suicidal behavior and previous suicidal attempts prior to the real events.

Strength of the study:

Owing to some limitations, we have enough strength. So far our knowledge, there has been no available surveillance system developed on suicide. Considering the importance of the issue, we have tried to collect the suicide related information in fifteen health centres for long six years by our field level staff and para professionals. This is an additional effort during their routine household visits. GK has an ample opportunity to continue the surveillance activities for more future years on extended population and with more information. Because we have 43 health centres all over the Bangladesh and all the centres may be utilized for that purpose.

Suicide is a criminal offence in Bangladesh. It is challenging to collect any event related information from household members due to their fear of police cases. But our community health workers, who are posted in rural health centres of GK and traditional birth attendants (TBAs) residing in corresponding villages are very close and trustworthy to the community people. The health workers have an attachment with people for their day-to-day services in clinic and also during household visits, which enable them to collect any suicide related information. Trained

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Health personnel collect data under strict supervision, which provide more validity of the data set.

This prospectively collection of suicide related data may not follow the stringent rules for surveillance, for example visiting any household on a schedule date, tracking the suicidal behavior of the family members, cross-checking the events with the help of neighbours etc. But due to the familiarity of our staff with the family and area and in-built system of getting any information provides the validity of the data-set is close to surveillance.

Overall, the results of our study are mostly consistent with other studies, among those conducted in Bangladesh.

Recommendations:

A large number of people in Bangladesh bears mental sufferings in their daily life. With the gradual increase of societal complexities posing upon human life ignite on their submerged depressive attitude towards committing events, like suicide. It is important to track out optimum depressive illnesses of the family members, to identify their suicidal behaviors and suicidal attempts for taking any preventive action. Region-specific differentials of suicide and adopting ways for awareness, like family level education, institutional modular orientation for children in school, mass campaign (in TV and newspaper, drama) and support is necessary. Criminal accusation for the family could be relaxed up to a logical acceptable limit. Available tools for suicide should be restricted to target populations, if known. Overall, the national suicidal surveillance system should be established immediately along with information on suicidal behavior.

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Conflict of interest

The authors declare that they do not have any conflict of interest.

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