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RESEARCH ARTICLE

Cause and age-related mortality trends in Bangladesh (2000-2008) [version 1; peer review: 2 approved with reservations]

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Abstract

Background

The purpose of this study was to analyze mortality trends in Bangladesh from 2000 to 2008, to identify the main causes of death, and categorize them by sex and age group.

Methods

This study used vital registration, maternal and child health data collected from Matlab, a rural area of Bangladesh, in 2000, 2004 and 2008. The data were collected and published by Health and Demographic Surveillance System of ICDDR, B.

Results

This study indicates a downward trend in communicable disease, neonatal and maternal, injury and miscellaneous mortality. Only non-communicable diseases (NCDs) revealed an uprising trend for both males and females. Among the NCDs, circulatory system related diseases were most common in Bangladesh. The second major cause of death was neoplasm. The risk of deaths from non-communicable diseases increased with age. The overall death rates were higher for males than females. Males of ages 45 and above were greatly affected by circulatory system related diseases and neoplasm. Circulatory system related deaths were highest (34.01%) in the 70-79 age group. Neoplasm related deaths were highest (34.38%) in the 60-69 age group. Similar patterns were observed for females. Circulatory system related diseases, respiratory related diseases and neoplasms greatly affected females of the 45-59 and above age group. The highest percentage (38.65%) of circulatory system related deaths was found in the 70-79 age group; neoplasm related deaths were highest (29.41%) in the 45-49 age group; and the highest percentage (32.69%) of respiratory related diseases was found in the 60-69 age group.

Conclusions

It was observed that a large portion of the population died because of non-communicable diseases. Public awareness about common NCDs and the risk factors involved should be raised. Promoting health-related content both in male and female education can bring improvements in reducing NCDs.

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Approval Status ? ?

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Any reports and responses or comments on the article can be found at the end of the article.

Keywords

non-communicable diseases, NCDs, mortality rate, percentage distribution

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Abbreviations

NCDs: noncommunicable diseases, ICDDR,B: International Centre for Diarrhoeal Disease Research, Bangladesh, D1: maternal and neonatal cause, D2: communicable cause, D3: noncommunicable cause, D4: miscellaneous cause.

Introduction

Mortality trends are important to demographers because they present a useful way of examining mortality differentials and their principal causes across populations. It has been reported that generally mortality rates in Bangladesh have reduced notably over recent decades¹. However, deaths caused by chronic diseases are rising at an alarming rate¹. There is a rapid rise observed in the burden of non-communicable diseases (NCDs) worldwide. Demographic transition and changing lifestyles among people are important factors for these kind of health problems². The World Health Organization (WHO) has predicted that, by 2020, two-thirds of the world's global burden of disease will be caused by non-communicable conditions³. In 2005 it was reported that non-communicable diseases such as heart disease, stroke, diabetes mellitus, cancer, and chronic respiratory diseases were responsible for 59% of the 57 million deaths yearly and 46% of the total burden of disease, globally³.

The burden of NCDs has been showing an increasing trend in South Asia, where almost half of all deaths in Asia and 46% of global burden of disease is attributable to these diseases⁵. It was observed in much of sub-Saharan Africa that the leading risks were those associated with poor quality of life⁶. Cardiovascular disease is a major non-communicable disease, taking almost 17 million lives each year⁷. It has been observed that decreasing primary risk factors such as inadequate nutrition, physical inactivity, smoking etc. can decrease death rate significantly⁷. Alam *et al.*⁸ investigated total deaths of adults with increasing age in Bangladesh and found communicable diseases responsible for 18% of overall deaths and NCDs responsible for 66%⁸. The NCDs included those caused by the circulatory system (35%), respiratory system (10%), digestive system (6%), neoplasms (11%) and endocrine and metabolic disorders (6%)⁸.

There are relatively few published studies about mortality, especially for NCDs, in developing countries like Bangladesh. It is therefore a timely necessity to categorize the country's mortality

data by cause of death, sex and age group. The aim of this study is to analyze mortality trends in Bangladesh. These will help in the development of strategies regarding the approach of the health sector to disease control. It is also important to increase awareness about which diseases will cause further burden in Bangladesh, in order to supply the suitable drugs.

Materials and methods

This study used vital registration, maternal and child health data collected from Matlab, a rural area of Bangladesh, in 2000, 2004 and 2008. The data were gathered and published by Health and Demographic Surveillance System of ICDDR,B. In 2000, 2004 and 2008, the surveys counted 218579, 224476 and 222218 individuals, respectively. In 2000, the surveys counted 106370 male individuals and 112209 female individuals. In 2004, the surveys counted 107439 male individuals and 117037 female individuals. In 2008, the surveys counted 103579 male individuals and 118639 female individuals.

Mortality rates

Mortality rate is a measure of the number of deaths in a population. It is expressed as number of deaths per 1000 individuals per year. Cause-specific mortality rate is the number of deaths from a particular cause of disease in a population during a fixed time period.

$$\text{Cause-Specific mortality rate} = \frac{\text{Number of deaths from a particular cause}}{\text{Total Population}} \times 100$$

Ethics approval

The ethical considerations of the study were approved on the 12/06/2012 by the University Research Ethics Committee, University of Rajshahi, Bangladesh.

Consent to participate

All participants were informed about the study and gave their written consent to participate.

Results

Table 1 shows total deaths and death rates in Bangladesh in 2000, 2004, and 2008. Regarding causes of death, neonatal and maternal diseases (D1), showed a decreasing trend both in males and females. Communicable diseases (D2) also showed decreasing

Table 1. Male and female mortality rates in Matlab, Bangladesh (2000–2008).

Year	Sex	Midyear population	Total deaths	D1	Rate	D2	Rate	D3	Rate	D4	Rate	Overall rate per thousand
2000	Male	106370	800	114	1.07	191	1.80	240	2.26	255	2.40	7.52
	Female	112209	633	147	1.31	97	0.86	160	1.43	229	2.04	5.64
2004	Male	107439	845	92	0.86	87	0.81	540	5.03	126	1.17	7.86
	Female	117037	708	108	0.92	48	0.41	436	3.73	116	0.99	6.05
2008	Male	103579	776	75	0.72	70	0.68	549	5.30	82	0.79	7.49
	Female	118639	661	58	0.49	51	0.43	465	3.92	87	0.73	5.57

trend. Non-communicable diseases (D3) showed an increasing trend, almost doubling its victim count between 2000 and 2004. Injuries and miscellaneous causes (D4) showed a statistically significant declining trend. The overall male death rate from year 2000 to year 2004 represented a growing trend and reached from 7.52 to 7.86, falling back to 7.49 in 2008. Similar trends can be seen for female death rates.

It is observed that males have a higher mortality rate than females in 2008. Also, the total number of deaths from non-communicable diseases was significantly higher than in the rest of the disease categories for both sexes. After analyzing Table 2, it has come to our attention that the percentage of male deaths was higher than female deaths across all years.

Table 3 provides age specific death rates for males in Bangladesh in 2000, 2004, and 2008. Infant mortality was highest in 2000, at 15 per 1,000 children. There was a gradual decline in rate of infant mortality from 2000 to 2008, with 11 per 1000 children in 2004

and 9 per 1000 children in 2008. The death rate was also declining for the 0–14 age category from 2000 to 2008. On the contrary, the 15–59 age group showed increasing death rates from 2000 to 2008, with 2.81 per thousand in 2000, 2.99 per thousand in 2004 and 3.04 per thousand in 2008. Finally, natural trends were observed in the 60+ age groups. Most people died at that age. Table 4 shows that for the 60+ age groups, female mortality was lower than male mortality in Bangladesh. Female death rates at ages of 60+ were 39 per thousand in 2000 and 42 per thousand in 2004. Among males, death rates at ages of 60+ were 48 per thousand males in 2000 and 54 per thousand males in 2004. The trends remained the same for 2008. This was also true for the age group 15–59. There was no statistically significant difference in death rates between males and females of the age group 0–14. Infant mortality was highest in 2000 amongst this age group, at 15 per thousand both in male and female infants. Female infant mortality exhibited a gradual decline over the years from 2000 to 2008, similar to male infant mortality. Infant mortality rate was 11 per thousand in 2004 and 6 per thousand in 2008.

Table 2. Distribution of deaths by gender (2000–2008).

	Matlab population 2000	Matlab population 2004	Matlab population 2008
Male	55.83	54.41	54.00
Female	44.17	45.59	46.00
Total deaths	1433.00	1553.00	1437.00

Table 3. Age specific death rates for males (2000–2008).

Age group	Midyear population for 2000	Total deaths for 2000	Rates per thousand	Midyear population for 2004	Total deaths for 2004	Rates per thousand	Midyear population for 2008	Total deaths for 2008	Rates per thousand
0–1	13039	199	15.26	13794	157	11.38	12919	111	8.59
0–14	40470	229	5.66	39400	175	4.44	38030	129	3.39
15–59	57397	161	2.81	58927	176	2.99	55866	170	3.04
60+	8503	410	48.23	9112	494	54.21	9683	477	49.26
Total	106370	800	7.52	107439	845	7.86	103579	776	7.49

Table 4. Age specific death rates for females (2000–2008).

Age group	Midyear population for 2000	Total deaths for 2000	Rates per thousand	Midyear population for 2004	Total deaths for 2004	Rates per thousand	Midyear population for 2008	Total deaths for 2008	Rates per thousand
0–1	12505	189	15.11	13305	144	10.82	12523	73	5.83
0–14	39520	203	5.14	38288	167	4.36	37198	86	2.31
15–59	64204	99	1.54	68851	129	1.87	70328	120	1.71
60+	8485	331	39.01	9898	412	41.62	11113	455	40.94
Total	112209	633	5.64	117037	708	6.05	118639	661	5.57

Table 5 shows that among the total male NCD related deaths in year 2004, 232 (43%) fall under the category of circulatory related disease, 82 (15%) of them fall in the neoplasm group, and 78 (14%) of them were respiratory related. Then, 59 (11%) male NCD related deaths fall under the category of digestive disease, 47 (9%) under endocrine disorder, 16 (3%) under neuro-psychiatric, 17 (3%) under genito-urinary and 9 (2%) under other NCDs. In the year 2008, 297 (54%) of NCD related deaths fall under the category of circulatory related disease, 96 (18%) fall in the neoplasm group, and 52 (10%) of them were respiratory related. Then, 40 (7%) fall under the category of digestive disease, 30 (5%) under endocrine disorder, 8 (1%) under neuro-psychiatric, 16 (3%) under genito-urinary, and 4 (1%) under other NCDs.

In **Table 6**, it can be observed that among the total female NCD related deaths in 2004, 234 of them (54%) fall under the category of circulatory related disease, 46(10%) of them fall in the neoplasm group, and 34 (8%) of them were respiratory related. Then, 51 (12%) female NCD related deaths fall under the category of digestive disease, 29 (6%) under endocrine disorder, 13 (3%) under neuro-psychiatric, 17 (4%) under genito-urinary and 12 (3%) under the other non-communicable disease category. Among the total female respondents, 282 (61%) of NCD related deaths in 2008 fall under the category of circulatory related disease, 51 (11%) fall in the neoplasm group and 52 (11%) of them were respiratory related. Then, 21 (4%) female NCD related deaths fall under the category of digestive disease, 31 (7%) under

Table 5. Male deaths from non communicable disease in the years 2004 and 2008.

Type of Disease	Frequency (male 2004)	Percent (male 2004)	Frequency (male 2008)	Percent (male 2008)
Neoplasm	82	15%	96	18%
Congenital malformation	0	0%	6	1%
Endocrine disorder	47	9%	30	5%
Neuro-psychiatric	16	3%	8	1%
Circulatory	232	43%	297	54%
Respiratory	78	14%	52	10%
Digestive disease	59	11%	40	7%
Genito-Urinary	17	3%	16	3%
Other non-communicable	9	2%	4	1%
Total	540	100%	549	100%

(ICDDR, 3B).

Table 6. Female deaths from non communicable disease in the years 2004 and 2008 (ICDDR, B).

Disease name	Frequency for female 2004	Percent of female 2004	Frequency for female 2008	Percent of female 2008
Neoplasm	46	10%	51	11%
Congenital malformation	0	0%	2	0%
Endocrine disorder	29	6%	31	7%
Neuro-psychiatric	13	3%	8	2%
Circulatory	234	54%	282	61%
Respiratory	34	8%	52	11%
Digestive disease	51	12%	21	4%
Genito-Urinary	17	4%	13	3%
Other non-communicable	12	3%	5	1%
Total	436	100%	465	100%

endocrine disorder, 8 (2%) under neuro-psychiatric, 13 (3%) under genito-urinary and 5 (1%) under the other non-communicable disease category.

Table 7 shows the distribution by age group of male circulatory and neoplasm related deaths. Circulatory system related diseases and neoplasms greatly affected the age groups 45–59 and above. Circulatory system disease related deaths were highest (34.01%) in the age group 70–79, and neoplasm related deaths were highest (34.38%) in the age group 60–69. The asymptotic significance level was 0.000. Given that the null hypothesis is rejected when the p-value is less than 0.05, this indicates a strong relationship between age and incidence of disease in men. (**Table 8**).

Table 9 shows the distribution by age group of female deaths caused by three major NCDs: circulatory system related diseases, neoplasms, and respiratory related diseases. Similar to what was observed in the male population, circulatory system related diseases, respiratory related diseases, and neoplasms had a greater effect on age groups 45–59 and above. Circulatory system disease related deaths were highest (38.65%) in the age group 70–79, neoplasm related deaths were highest (29.41%) in the age group 45–59 and respiratory related deaths were highest (32.69%) in the age group 60–69. The asymptotic significance level was less than 0.05 (**Table 10**). Given that the null hypothesis is rejected when

Table 7. Male circulatory and neoplasm related deaths, distributed by age group, in Matlab (2008).

Age group years	Circulatory	Neoplasm
0–4	0.00%	2.08%
5–14	0.34%	2.08%
15–29	1.35%	2.08%
30–44	3.70%	6.25%
45–59	13.80%	26.04%
60–69	24.24%	34.38%
70–79	34.01%	21.88%
80+	22.56%	5.21%

Table 8. Chi-Squared tests between circulatory and neoplasm related deaths by age groups for males in Matlab, 2008.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Squared	35.050	7	.000
Likelihood Ratio	36.777	7	.000
Linear-by-Linear Association	30.445	1	.000

Table 9. Female circulatory, neoplasm and respiratory related deaths, distributed by age group, in Matlab (2008).

Age group	Circulatory	Neoplasm	Respiratory
0–4	0.35%	3.92%	00.0%
5–14	0.35%	00.0%	1.92%
15–29	1.06%	3.92%	00.0%
30–44	1.77%	11.76%	1.92%
45–59	7.80%	29.41%	13.46%
60–69	26.60%	27.45%	32.69%
70–79	38.65%	21.57%	26.92%
80+	23.40%	1.96%	23.08%

Table 10. Chi-Squared tests among circulatory, neoplasm and respiratory deaths by age groups for females in Matlab, 2008.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Squared	60.533	14	.000
Likelihood Ratio	54.340	14	.000
Linear-by-Linear Association	9.739	1	.002

the p-value is less than 0.05, this indicates a strong relationship between age and incidence of disease in females (**Table 10**).

Discussion

In 1990, worldwide and regional cause-of-death patterns were measured across age groups. It was found that 98% of all deaths in children below 15, 83% of all deaths in the 15–59 age group, and 59% of all deaths in the 70+ age group were occurring in the developing world⁹. The disease mortality pattern in elderly patients of a Nigerian teaching hospital was studied from January 2007 to December 2011. A total of 3,002 elderly (>65 years) people were admitted, of which 561 died. Among the population, 317 were male and the rest were females. Cerebrovascular disease was the top cause of death (25.1%). The second and third major causes of death were malignancies (15.2%) and diabetes mellitus (8%)¹⁰. A cross-sectional study involving 535 inhabitants of Sokoto in Nigeriatio displayed the prevalence and pattern of non-communicable diseases. The participants were overweight, obese and morbidly obese, and represented 12.3%, 6.7% and 0.9% of the population, respectively. The prevalence of pre-hypertension and hypertension was 8.5% and 30.2%, respectively¹¹.

Deaths from non-communicable diseases represent a rising trend. Our results support the finding that non-communicable diseases are imposing a sizeable and growing public health burden

globally^{12–18}. Vital registration, maternal and child health data was collected from Matlab, Bangladesh, in 2000, 2004 and 2008. The data were collected and published by Health and Demographic Surveillance System of ICDDR, B. Among the total male NCD related deaths in year 2004, 232 (43%) fall under the category of circulatory related disease, 82 (15%) of them fall in the neoplasm group, and 78 (14%) of them were respiratory related. Then, 59 (11%) male NCD related deaths fall under the category of digestive disease, 47 (9%) under endocrine disorder, 16 (3%) under neuro-psychiatric, 17 (3%) under genito-urinary and 9 (2%) under other NCDs. In the year 2008, 297 (54%) of male respondents fall under the category of circulatory related disease, 96 (18%) fall in the neoplasm group, and 52 (10%) of them were respiratory related. Then, 40 (7%) deaths fall under the category of digestive disease, 30 (5%) under endocrine disorder, 8 (1%) under neuro-psychiatric, 16 (3%) under genito-urinary, and 4 (1%) under other NCDs.

Among the total female respondents, 234 (54%) of NCD related deaths in 2004 fall under the category of circulatory related disease, 46 (10%) of them fall in the neoplasm group, and 34 (8%) of them were respiratory related. Then, 51 (12%) female NCD related deaths fall under the category of digestive disease, 29 (6%) under endocrine disorder, 13 (3%) under neuro-psychiatric, 17 (4%) under genito-urinary and 12 (3%) under the other non-communicable disease category. Among the total female respondents, 282 (61%) of NCD related deaths in 2008 fall under the category of circulatory related disease, 51 (11%) fall in the neoplasm group and 52 (11%) of them were respiratory related. Then, 21 (4%) female NCD related deaths fall under the category of digestive disease, 31 (7%) under endocrine disorder, 8 (2%) under neuro-psychiatric, 13 (3%) under genito-urinary and 5 (1%) under the other non-communicable disease category. There were more male deaths due to neoplasms and more female deaths due to circulatory related disease.

It is recognized that a huge portion of the population will die because of non-communicable diseases. The number of deaths rapidly increases year by year^{12,19}. Males of ages 45 and above were greatly affected by circulatory system related diseases and neoplasms. Circulatory system related deaths were highest (34.01%) in the 70–79 age group. Neoplasm related deaths were highest (34.38%) in the 60–69 age group. Similar patterns were observed for females. Circulatory system related diseases, respiratory related diseases and neoplasms greatly affected females of the 45–59 age group and above. The highest percentage (38.65%) of circulatory system related deaths was found in the 70–79 age group; neoplasm related deaths were highest (29.41%) in the 45–59 age group; and the highest percentage (32.69%) of respiratory related diseases was found in the 60–69 age group.

Conclusions

This study recognized that a huge number of people die because of non-communicable diseases. This number increases year by year at a large scale. Deaths from circulatory related diseases were significantly higher than from other non-communicable diseases. In females, the mortality rate was very high for these. The second major cause of death was from neoplasms for the male population in 2008. Circulatory system related diseases and neoplasms greatly affected the 45–59 age groups and above. For females, the death rate was very high for respiratory related diseases. Females were affected by non-communicable diseases at a younger age than males. Circulatory system related diseases, neoplasms and respiratory related diseases are the top three NCDs which have massive impact on the health of the population, and should therefore be given the utmost attention. These three NCDs and their associated risk factors should be targeted in all public health awareness programs.

The national policy and action plan should take these points into consideration, and focus on improving basic education and expanding public health systems to raise awareness. Mass media outlets such as television, newspapers, radios, and the internet can play an effective role to promote consciousness and alert people to the dangers posed by NCDs. Awareness campaigns can positively modify attitudes. Finally, the Ministry of Health and Family Welfare should train more personnel, achieve national coverage and promote more research on the subject, thus ensuring high standards are kept.

Data availability

Raw datasets have not been made available at the request of the ethics committee in order to maintain participant confidentiality. This data is stored at the Department of Statistics, University of Rajshahi, and is available upon request. Please contact the 1st author (Aziza Sultana Rosy Sarkar, email: asrosy2012@gmail.com) for further information.

Author contributions

ASRS participated in the design of the study and performed the statistical analysis. ASRS, MNI conceived the study, and participated in its design and coordination and helped draft the manuscript. All authors read and approved the final manuscript.

Competing interests

No competing interests were disclosed.

Grant information

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It is important to examine the trends of age-specific mortality rate and to identify the causes. I suggest that this manuscript would be indexed after revision.

My major comments:

Title: Matlab DHSS is located in rural Bangladesh and does not represent urban Bangladesh. In this case, suggestion is to add either "rural Bangladesh" or "evidence from Matlab DHSS" in the title.

Abbreviations: Suggestion is to add "WHO: World Health Organization" which I found in the 1st paragraph of "Introduction" and delete D1 to D4 as these are not the abbreviations i.e. shortened form of different causes of death. D1 to D4 are the operational symbols of different causes of deaths.

Introduction: In 2017, Reference 3 "WHO: world health report 2002" is not acceptable. Authors should cite current WHO report on NCD which is available online. In the 2nd paragraph, how Reference 5 is linked to the Reference 6 as authors did not mention whether NCD is also a burden in sub-Saharan Africa. They can mention "why NCD is increasing in South Asia", "what is the prevalence of NCD related risk factors". In the last paragraph, instead of mentioning "Bangladesh", they should mention "rural Bangladesh" and in order to emphasize why it is important to study the mortality trends of rural Bangladesh; they should add that "In Bangladesh, population is mainly rural, almost 80 percent of the population living in rural areas" with appropriate reference.

Materials and methods: D4 is "Injuries and miscellaneous cause" which was not mention properly under "Abbreviation" section and "D1 to D4" should remove from the "Abbreviation" section to this section. In the reference 8, Alam *et al.* who used Matlab DHSS data, mentioned that verbal autopsy (VA) was conducted to identify the causes of death. Authors should check the information

whether VA was done in their case or not. If yes, they should mention it in this section and add "VA" in the abbreviation section. Demographers normally get the total number of deaths from vital registration and in order to know the causes of death, VA is the most appropriate. In this section, authors should mention that they run 'Chi-squared test' to examine the relationship between age and different causes of death for both sexes, which they presented in Table 8 and 10. In the 1st paragraph of the result section, authors mentioned "Injuries and miscellaneous causes showed a statistically significant declining trend" and in the 2nd paragraph, "the total number of deaths from noncommunicable diseases was significantly higher than in (delete "in") the rest of the disease categories for both sexes". Authors should mention here about statistical analysis before presenting the findings in the result section.

Cause-Specific mortality rate:

1. **Definition:** delete "of disease" as particular cause can be either disease or injury or accident etc.
2. **Formula:** it should be "per 1000", not 100

Consent to participate: This article is based on secondary data analysis. Suggestion is "All participants gave their written consent when ICDDR,B collected data for vital registration".

Results: As authors presented their study findings in tables (mainly Table 5 & 6); they do not need to mention the findings of each row and column in text. They should mention only the important findings which they will interpret in the discussion section. Example: the main focus of this manuscript is NCD; in this case, congenital malformations, neuro-psychiatric, digestive disease, genito-urinary are not relevant to highlight in the result section.

Discussion: Authors repeated their study findings in the 2nd, 3rd and last part of 4th paragraph which they should not do. In this section, they should interpret their results and describe the significance of their study findings by comparing with the findings of other studies. They should do critical analysis of their study findings. In the 1st paragraph, they compared their study findings with a hospital based study where the respondents were elderly patients and this is not relevant as Matlab DHSS is population based. And in the last part of 1st paragraph where they mentioned about a cross sectional study; how this study finding is related to interpret their study findings.

Limitation of study: Author should add this section. In this section, they can mention that they do not have detailed and correct information about causes of death related to NCD; e.g. whether "respiratory disease" is representing only COPD, which is NCD or other respiratory disease. In the similar way, whether "endocrine disorder" includes only diabetes or other endocrine problem like Thyroid disease. In Tables 5 & 6, I did not find the information on 2000 and in Table 7 I did not find the information on "respiratory". Does it mean that these information were not available, if yes, authors should mention in this section.

My minor comments:

- Authors should avoid repetition; e.g.
 - In the last paragraph of Discussion and first paragraph of Conclusion "huge portionyear by year"- more or less same meaning.
 - Table 5 is for male, so no need to mention "male 2004" under "Frequency and Percent". Same comment for Table 6

- Table 1: could be re-organized.
 - After the column "Total deaths", authors can add the column "Overall rate per thousand"
 - D1 and Rate: These two columns under D1; 1st column is for total number of deaths due to D1 and 2nd column is death rate per 1000 due to D1. These two columns can be reorganized

D1	D2	D3	
D4			
Total deaths Rate per 1000	Total deaths Rate per 1000	Total deaths Rate per 1000	
Total deaths Rate per 1000			

- Table 2: authors should delete two digits (.00) after the number of total deaths. They can add one more row for "Total percentage" in addition to "Total deaths"

- Table 3 & 4 heading can be re-arranged:

Age	2000	2004
↓		
Group Midyear population Total deaths Rate/1000	Midyear population Total deaths Rate/1000	

2008
Midyear population Total deaths Rate/1000

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: |

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 24 April 2017

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The manuscript' objective is to analyze mortality trends in Bangladesh from 2000 to 2008, to identify the main causes of death, and categorize them by sex and age group with vital registration, maternal and child health data collected from Matlab, a rural area of Bangladesh, in 2000, 2004 and 2008 through Health and Demographic Surveillance System of ICDDR, B.

It is very significant to directly report the mortality trend in developing countries like Bangladesh. The data are from original vital registration and maternal and children health. However authors do not describe the vital registration and maternal and children health collecting systems. How to work of these collecting systems? Who report the status of victims to whom? How many cases are diagnosed by hospital? These basic information are very necessary in the manuscript. Also how about the quality of these collecting system, underreporting, or misreporting? Authors should supplement these messages.

As the number of deaths per year is only about 800, it is understanding why authors classified a bigger age span for mortality. I still suggest mortality aged from 15-59 is divided into 2 groups: 15-39, and 40 - 59. In addition authors do not emphasize the total mortality rate is crude death rate or standard death rate, but it should be the standard death rate for comparison with different annual mortality.

The third, the death causes. Authors very briefly define the death causes: D1 neonatal and maternal diseases (D1), D2 Communicable diseases, D3: Non-communicable diseases and D4 Injuries and miscellaneous causes. The definition on death causes is hard to satisfy the death causes analysis. Authors should refer to the International classification of death causes, the results of the manuscript can be understood by international colleagues. Especially authors list the subdivision category of chronic non-communication diseases without ICD code in Table 5, so it is hard to understand whether the diseases is same disease on the international category of diseases causes.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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