Study the Differentials, Patterns and Trends of Asdrs of Bangladesh

Md. Rafiqul Islam
Department of Population Science and Human
Resource Development, Rajshahi University, Bangladesh

Abstract: The purpose of the present study is to study the differentials, patterns and trends of age specific death rates (ASDRs) of Bangladesh during 1961-1991. To fulfil the aim of this study, the ASDRs of Bangladesh in the census years 1961, 1974, 1981 and 1991 have been taken from Islam.

Key words: Age specific death rates (asdrs), age differential, sex differential, trend

INTRODUCTION

Bangladesh is a developing country with accelerated population growth. Like many other developing countries, Banglsdesh faces severe problems after her independence in 1971. Population is one of the main problems. On the one hand, population growth is very high. On the other hand, death rate is too, that is, mortlity is also very high. There are various types of measures of mortality such as crude death rate, monthly death rate, infant mortality rate, infant death rate, maternal mortality rate, endogeneous death rate, exogeneous death rate, neo-natal mortality rate, post neo-natal mortality rare, cause specific death rate, urban-rural specific death rate, sex-specific death rate, ASDRs etc. But, in this study author has tried to study only ASDRs of Bangladesh. In fact, ASDRs related to an interval ages x to x+n which is very important and significant measure in mortality analysis. Because, mortality pattern is apprehended at different ages for a particular year or short period of time. The ASDRs is also known as central death rate or central mortality rate. It may change from country to country, developed country to under developed country, region to region, sex to sex, religious to religious, occupation to occupation and time to time. It should be mentioned here that the traditional pattern of ASDRs is U-shape pattern[1,2]. So, the main aims and objectives of this study are as follows:

MATRIEALS AND METHODS

In the present study ASDRs have been estimated from Islam[3] in which eight abridged life tables constructed by Widowhod method using marital status information of the censuses of 1961[4], 1974[5], 1981[6] and 1991[7]. In which ASDRs have been estimated using the formula

ASDR $= {}_n d_x / {}_n L_x$ [8];

where, ${}_N d_x$ is the number of deaths in the age interval x to x+n and ${}_n L_x$ is stationary population in a life table.

It is to be noted here that there are some sort of distortion exists in the estimated ASDRs. For this, ASDRs need to be smoothed. Therefore, ASDRs have been smoothed by latest smoothing method '4253H, Twice'[9]. Smoothing method has been implemented using the package Minitab release 12.1 (Table 1).

RESULTS AND DISCUSSION

From the Table 1, it is seen that the curves of ASDRs have been displayed traditional U-shape pattern. And each of them rapidly decreases with increase of ages in the age interval (0, 4) years and more slowly decreases in the interval (4, 20) years and smoothly increases in the ages (20, 60) years and then afterward more rapidly increases relatively compared to other ages in the whole domain (0, 80+) years. It is also observed that the smoothed ASDRs for male is higher than that of female in the age interval (0, 1). But, ASDRs for female is larger than male in (2, 40) years and then ASDRs for male is also greater than that of female in sub domain (40, 80+) of the given domain excepting last age group. Probably, both curves cross each other at the ages 2 years and 35-39 years. The highest and lowest ASDRs for male and female are 0.32259 and 0.00285, 0.32435 and 0.00399 in the same age last age group and 15-19 years respectively in which female is higher than male in both cases.

To investigate the sex differentials of smoothed ASDRs from the Table 2, it is seen that the curves of ASDRs have also been indicated conventional U-shape pattern and each of which rapidly decreases in the age interval (0, 2) years and more slowly decreases in the ages (3, 20) years and smoothly increases in the continuous ages (20, 70) years and then afterward more rapidly increase relatively compared to the other ages. It is also observed that the smoothed ASDRs of male is higher than that of female in the age interval (0, 2). But, ASDRs for female is greater than male in (3, 35) years and ASDRs of

Table 1: Estimated and smoothed ASDRs for male, female and both sexes of bangladesh in 1961

Age groups	Male Estimated ASDRs	Male Smoothed ASDRs	Female Estimated ASDRs	Female Smoothed ASDRs	Both sexes Estimated ASDRs	Both sexes Smoothed ASDRs
0	0.18758	0.18207	0.16957	0.16434	0.17853	0.17316
1	0.07003	0.09744	0.07197	0.09225	0.071	0.09483
2	0.03719	0.04431	0.03947	0.04532	0.03834	0.04482
3	0.02281	0.02162	0.02454	0.02341	0.02368	0.02252
4	0.01511	0.01231	0.01637	0.01331	0.01574	0.01281
5-9	0.00632	0.00654	0.00684	0.00719	0.00658	0.00686
10-14	0.0026	0.00334	0.00291	0.00419	0.00275	0.00377
15-19	0.00302	0.00285	0.00422	0.00399	0.00363	0.00344
20-24	0.00357	0.00337	0.00516	0.0047	0.00436	0.00405
25-29	0.00432	0.00404	0.00552	0.00538	0.00492	0.00472
30-34	0.00538	0.0052	0.00643	0.00616	0.0059	0.00568
35-39	0.00714	0.00707	0.00733	0.00714	0.00723	0.00711
40-44	0.00996	0.00992	0.00869	0.00854	0.00933	0.00922
45-49	0.01413	0.01437	0.01116	0.01144	0.01265	0.01287
50-54	0.02089	0.02114	0.01682	0.01727	0.01884	0.01915
55-59	0.02948	0.03167	0.02587	0.02715	0.02765	0.02937
60-64	0.04417	0.04489	0.04018	0.04046	0.04213	0.04269
65-69	0.06373	0.05765	0.05905	0.0547	0.06131	0.05612
70-74	0.0913	0.08806	0.08786	0.08649	0.0895	0.08698
75-79	0.05269	0.17548	0.06376	0.17519	0.05844	0.17494
80+	0.39999	0.32259	0.4	0.32435	0.4	0.32311

Table 2: Estimated and smoothed ASDRs for male, female and both sexes of bangladesh in 1974

Age groups	Male Estimated ASDRs	Male Smoothed ASDRs	Female Estimated ASDRs	Female Smoothed ASDRs	Both sexes Estimated ASDRs	Both sexes Smoothed ASDRs
0	0.2043	0.19329	0.19256	0.18519	0.19841	0.18923
1	0.06396	0.09908	0.06528	0.09647	0.06463	0.09777
2	0.03297	0.04126	0.03421	0.04171	0.03359	0.04149
3	0.01996	0.01851	0.02083	0.01943	0.0204	0.01897
4	0.01314	0.01051	0.01375	0.01095	0.01345	0.01073
5-9	0.00547	0.00566	0.00571	0.00599	0.00559	0.00582
10-14	0.00225	0.00288	0.00241	0.00344	0.00233	0.00316
15-19	0.00261	0.00246	0.00346	0.00326	0.00304	0.00287
20-24	0.00307	0.0029	0.00419	0.00384	0.00363	0.00338
25-29	0.0037	0.00347	0.00449	0.00437	0.00409	0.00393
30-34	0.00458	0.00443	0.00522	0.005	0.0049	0.00472
35-39	0.00607	0.00601	0.00596	0.00581	0.00601	0.00592
40-44	0.00843	0.00843	0.00712	0.00703	0.00778	0.00773
45-49	0.01191	0.01218	0.00915	0.00948	0.01053	0.01083
50-54	0.01751	0.01781	0.01375	0.01422	0.01561	0.016
55-59	0.02459	0.02644	0.02101	0.02232	0.02276	0.02434
60-64	0.03666	0.03677	0.03243	0.03214	0.03449	0.03439
65-69	0.05283	0.04631	0.04754	0.04121	0.05008	0.04367
70-74	0.0762	0.07449	0.07104	0.06997	0.07349	0.07214
75-79	0.02497	0.16109	0.02958	0.16	0.0274	0.16051
80+	0.4	0.30786	0.4	0.31295	0.4	0.3105

male is also larger than female in the sub domain (35, 80+) years of the given domain excepting last age group. Both curves cross each other at the ages 3 years and 35-39 years. The largest and smallest extent of ASDRs for male and female are 0.30786 and 0.00246, 0.31295 and 0.00326 in the same age, last age and 15-19 years respectively in which female is higher than male in both cases.

The different columns of Table 3 indicate the estimated and smoothed ASDRs for male, female and both sexes of Bangladesh in 1981 respectively. It is observed

that the three curves of ASDRs have been indicated as usual pattern i. e. U-shape pattern and similar type. To see the sex differentials of smoothed ASDRs from the table, it is observed that the curves of ASDRs for male and female decrease rapidly in the age interval (0, 2) years and more slowly decreases in the ages (3, 20) years and gradually increases in the continuous ages (20, 70) years and afterward, more rapidly increases in the interval (70, 80+) years relatively compared to the other ages. It is also observed that the smoothed ASDRs for male is higher

Table 3: Estimated and smoothed ASDRs for male, female and both sexes of bangladesh in 1981

Age groups	Male		Female		Both sexes	
	Estimated ASDRs	Smoothed ASDRs	Estimated ASDRs	Smoothed ASDRs	Estimated ASDRs	Smoothed ASDRs
0	0.15357	0.14807	0.14294	0.13871	0.14824	0.14392
1	0.0525	0.0772	0.05258	0.07383	0.05254	0.075647
2	0.02738	0.03345	0.02784	0.03326	0.02761	0.033358
3	0.01671	0.01568	0.01707	0.01607	0.01689	0.015873
4	0.01113	0.00896	0.0113	0.00909	0.01122	0.00903
5-9	0.00473	0.00487	0.00476	0.00498	0.00475	0.004927
10-14	0.00199	0.00258	0.00203	0.0029	0.00201	0.00274
15-19	0.00236	0.00223	0.00291	0.00275	0.00263	0.002495
20-24	0.00278	0.00261	0.00354	0.00324	0.00316	0.002939
25-29	0.00339	0.00315	0.00385	0.00375	0.00362	0.003463
30-34	0.00423	0.00409	0.00456	0.00438	0.0044	0.004252
35-39	0.00572	0.00565	0.00535	0.00522	0.00553	0.005442
40-44	0.00816	0.00813	0.00657	0.00643	0.00736	0.007276
45-49	0.01188	0.01215	0.00867	0.00888	0.01027	0.010484
50-54	0.01809	0.01843	0.01334	0.01376	0.01567	0.016022
55-59	0.02622	0.02838	0.02087	0.02223	0.02346	0.025177
60-64	0.04014	0.04065	0.03305	0.03316	0.03643	0.036699
65-69	0.05871	0.0522	0.04968	0.04401	0.0539	0.047827
70-74	0.08519	0.08219	0.07556	0.07401	0.07995	0.077779
75-79	0.0432	0.17073	0.0415	0.16448	0.04226	0.167331
80+	0.39999	0.32004	0.4	0.31775	0.4	0.31875

Table 4: Estimated and smoothed ASDRs for male, female and both sexes of Bangladesh in 1991

Age groups	Male		Female		Both sexes	
	Estimated ASDRs	Smoothed ASDRs	Estimated ASDRs	Smoothed ASDRs	Estimated ASDRs	Smoothed ASDRs
0	0.09716	0.09323	0.11325	0.10766	0.10516	0.10040
1	0.03257	0.04843	0.03616	0.05528	0.03435	0.05183
2	0.01691	0.02083	0.01850	0.02309	0.01770	0.02195
3	0.01042	0.00974	0.01119	0.01036	0.0108	0.01004
4	0.00703	0.00566	0.0074	0.00586	0.00721	0.00575
5-9	0.00311	0.00318	0.00315	0.00327	0.00313	0.00323
10-14	0.00138	0.0018	0.00136	0.00191	0.00137	0.00186
15-19	0.00167	0.00159	0.0019	0.0018	0.00179	0.0017
20-24	0.002	0.00184	0.00231	0.00212	0.00215	0.002
25-29	0.00248	0.00228	0.00257	0.0025	0.00252	0.00241
30-34	0.00311	0.00305	0.00312	0.00302	0.00311	0.00305
35-39	0.00437	0.00431	0.00381	0.00373	0.00409	0.00403
40-44	0.00656	0.00652	0.00492	0.0048	0.00575	0.00567
45-49	0.01014	0.01044	0.00674	0.00691	0.00845	0.0087
50-54	0.01651	0.01703	0.01067	0.01108	0.01357	0.01403
55-59	0.0255	0.02821	0.01709	0.01845	0.02119	0.02314
60-64	0.0411	0.0422	0.02774	0.02764	0.03407	0.03446
65-69	0.06196	0.05519	0.04284	0.03642	0.05152	0.04503
70-74	0.09124	0.08483	0.06658	0.06542	0.07713	0.07417
75-79	0.0182	0.16745	0.02479	0.1566	0.02207	0.1614
80+	0.4	0.30532	0.4	0.31157	0.4	0.30861

than female in (0, 2) years. But, ASDRs for female is greater than that of male in the interval (3, 35) years and ASDRs for male is also larger than that of female excepting 80+ years in (35, 80+) years. Nevertheless, both curves of ASDRs cross each other at the ages 3 years and 35-39 years. The maximum and minimum value of ASDRs for male and female are 0.32004 and 0.00223, 0.31775 and 0.00275 in the same age group, last age group and 15-19 age group respectively in which maximum value of ASDRs for male is higher than that of female where as the minimum value of ASDRs of female is higher than ASDRs of male.

The estimated and smoothed ASDRs for male, female and both sexes of Bangladesh in 1991 census have been presented in Table 4. It is observed that the three curves of ASDRs have been displayed traditional U-shape pattern and similar type. To find the sex differentials of smoothed ASDRs, it is found that the curves of ASDRs for male and female decrease fastly in the age interval (0, 2) years and more slowly decrease in (3, 15) years and
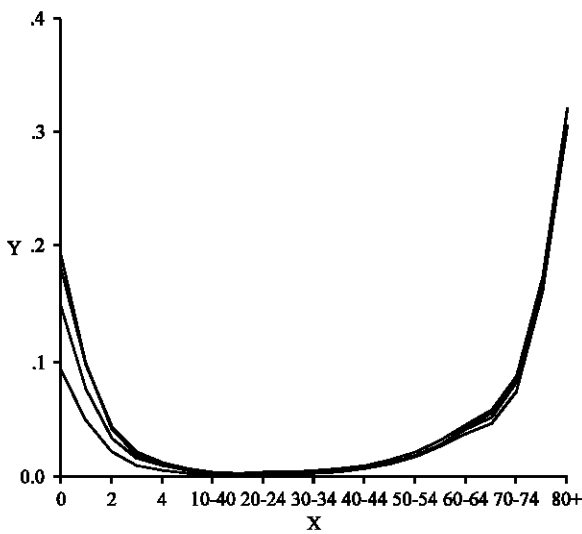
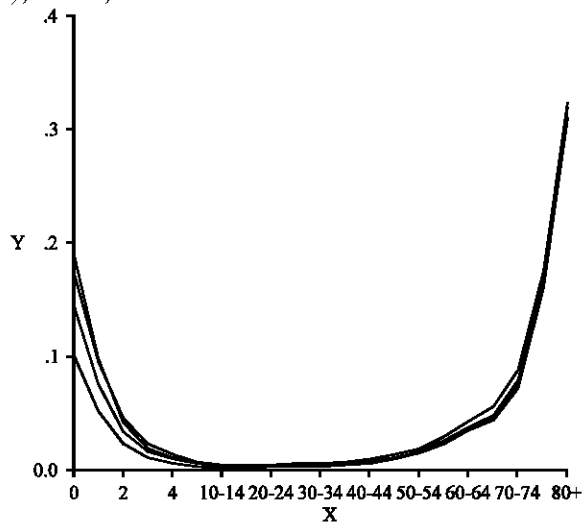Fig. 1:   ASDRs for male of Bangladesh during 1961-1991. X: Age group in years and Y: ASDRs.
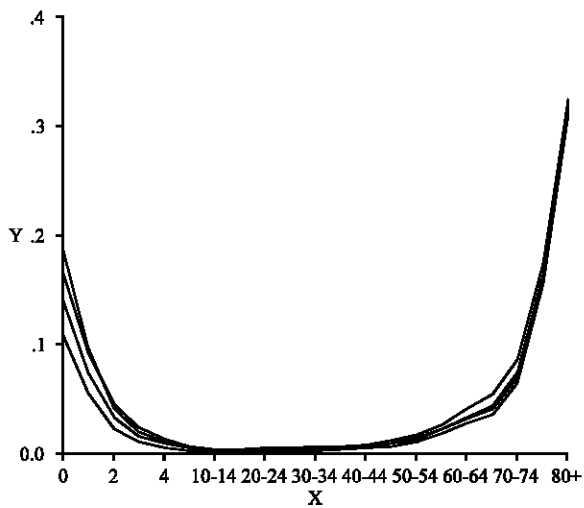

Fig. 2:   ASDRs for female of Bangladesh during 1961-1991. X: Age group in years and Y: ASDRs

smoothly increase in the age interval (15, 60) years and afterward, more rapidly increase in (60, 80+) years relatively compared to other ages. It is also observed that the smoothed ASDRs for female is higher than male in the age interval (0, 30) years where as male ASDRs is higher than female in (30, 80+) years excepting last age group. The minimum and maximum extent of ASDRs for male are 0.00159 in the ages 15-19 years and 0.30532 in the last age group where as female are 0.0018 and 0.31157 in the same ages respectively. It is found that male is smaller than female in both cases.

Now, to observe the trends and patterns of ASDRs for male, female and both sexes of Bangladesh have been

Fig. 3:   ASDRs for both sexes of Bangladesh during 1961-1991. X: Age group in years and Y: ASDRs

plotted in the graph paper and depicted in Fig. 1, 2 and 3, From these figures, it is observed that ASDRs for male, female and both sexes exhibit traditional U-shape pattern. It is found that with passing of time the peak of the curves of ASDRs for male, female and both sexes are showing decreasing trend, that is, they indicate downward pattern with respect to time. For ASDRs for male, the minimum values are 0.00285 in 1961, 0 .00246 in 1974, 0 .00223 in 1981 and 0 .00159 in 1991. But, the minimum extent of ASDRs for female are 0.003999, 0.00326, 0.00275 and 0.0081 in 1961, 1974, 1981 and 1991 respectively where as 0.00344, 0.00287, 0.002495 and 0.0017 are both sexes. During the study period, the minimum extent of ASDRs for male, female and both sex have been showing decreasing trends and the peak are converted from .00285 to .00159 and .003999 to .0081 and .00344 to .0017, respectively. It is concluded that the trends of ASDRs are downward passing through time. It is also observed that female peak is higher than that of male in each census years.

CONCLUSIONS

It is seen that ASDRs for male, female and of Bangladesh at different censuses exhibit traditional U-shape pattern as well as approximately similar pattern. It is seen that two sides of U-shape curve indicating the high death of infancy and old ages. It is also found that U-shape curve of ASDRs is asymmetrical. In fact, it is right skewed, i.e. positive skewed. It is observed that the peaks of the curves for male, female and both sexes are showing decreasing trend over time, that is, they display downward pattern with respect to time during 1961-1991.

REFERENCES

1. Misra, B.D., 1982-1995. An Introduction to the Study of Population, 2nd Edn, South Asian Publishers Pvt.Ltd., New Delhi.
2. Shryock, H.S. and J.S. Siegel *et al*, 1975. The Methods and Materials of Demography, Vol. II, U.S. Government Printing Office, Washington.
3. Islam, Md. and Rafique, 2003. Modding of demographic parameters of Bangaladesh. An empirical forcasting. Unpublished. Ph.D. Thesis, Rajshahi University.
4. Nomani, H., 1964. Population Census of Pakistan 1961, Vol. 2 (East Pakistan), Karachi, Government of Pakistan.
5. BBS, 1977. Population Census of Bangladesh 1974. National Volume, Government of the People's Republic of Bangladesh, Dhaka.
6. BBS, 1984. Bangladesh Population Census 1981, National Series, Government of the People's Republic of Bangladesh, Dhaka.
7. BBS, 1994. Bangladesh Population Census 1991, Vol. 1, National Series, Government of the People's Republic of Bangladesh, Dhaka.
8. Barclay, G.W., 1958. Techniques of Population Analysis, John Wiley and Sons, Inc.
9. Velleman, P.F., 1980. Definition and Comparison of Robust Nonlinear Data Smoothing Algorithms, J. the Am. Statistical Asso., 75: 609-615