INNOVATIVE JOURNAL OF MEDICAL SCIENCES
"A Quarterly Peer Reviewed Journal"

www.ijms.co.in

Innovative Journal of Medical Sciences, 2017; 1(2):07-11

RESEARCH ARTICLE

Regional Disparity of Aging Process in Bangladesh

***M. Taj Uddin[1], Ahmad Kabir[1], Md Nazrul Islam[1], Dr Iqbal Ahmed Chowdhury[2]**

[1]Department of Statistics, Shahjalal University of Science and Technology, Sylhet, Bangladesh*
[2]Assistant Professor, Department of Medicine, Colonel Malek Medical College, Manikganj, Dhaka Bangladesh

Received on: 25/09/2017, Revised on: 30/10/2017, Accepted on: 20/11/2017

ABSTRACT

Aging is a process of growing old. This study is an attempt to assess the regional variation of population aging in Bangladesh using both census and survey data collected from Bangladesh Bureau of Statistics. Different indicators of population aging have been used for analysis. It is found that Barisal and Khulna division is placed top aged region of the country. It is also observed that Rajshahi, Chittagong and Sylhet division is placed bottom aged region of the country. The analysis shows that the division with less proportion of children indicates top aged region and division with high proportion of children indicate bottom aged region. The rural areas of each division show more aged than urban areas. It is found that male elderly is higher than female. So there is a regional disparity of aging showing urban-rural and male-female gap.

Key words: aging process, disparity, Bangladesh

INTRODUCTION

Spatial aging is relatively a new concept of demographic aging. It mainly concerns the population aging of all possible segments in a geographical area. The most fundamental geographic concepts are site and situation. Site refers to the characteristic features of a place, whereas situation refers to the way in which a place is connected to other places either by natural processes or by human processes, such as transportation or communication [1]. The first law of geography is that everything is related to everything else, but near things are more related than distant things [2]. Population density is a fundamental measure in demographic research which is of particular interest to population geographers. It is measured by the ratio of the size of the population to the size of the geographic area that contains the population. It is an explicitly spatial concept. According to the United Nations, in 2005 the Netherlands had a population density of 395 per square kilometer, whereas Canada's population density was 3 per kilometer. The variation in population density is striking. This example illustrates another important concern for the population geographer - spatial variation.Voss et al. [3] explains that until the mid-20th century virtually all demography, in the United States at least, was spatial demography. They make this claim because they define spatial demography as the formal demographic study of areal aggregates. They argue that in the years since about 1950, the scientific study of population came to be dominated by attention to the individual as the agent of demographic action. It was at this time that spatial demography gave way to micro-demography. Moreover, the field of spatial demography remained disengaged from the important trends that emerged in the 1980's in the disciplines of geography, regional science and spatial econometrics. Anselin [4] published a comprehensive book on spatial econometrics. By the start of the 21st Century, demography was described by some as possessing a rich methodology, but largely lacking a spatial perspective. A spatial perspective is more complex than simple areal aggregation.

Many research and policy questions faced by demographers require analysis of complex patterns of interrelated social, behavioral, economic, and environmental phenomena. In addressing these questions, it is increasingly argued that both spatial thinking and spatial analytical perspectives have an important role to

***Corresponding Author:** Dr. M. Taj Uddin, **Email**: mtajstat@yahoo.com

play [5]. Space is a crucial element for demographic studies. Migratory movements only exist because people perceive some places to be more attractive than others. Mortality levels are far from being spatially homogenous, since the presence or absence of certain risk factors varies by location. Nevertheless, population studies that include a spatial component have not occupied a significant space in major demography journals, and spatial demography is virtually ignored as part of the regular training of future professionals in the field [6]. The applications of spatial demography have been growing recently. Different reasons account for that. First, there is a large availability of spatial data, including all the information released by the US Census Bureau [7]. Second, several computer programs have been developed to facilitate the use of spatial analysis [8]. Third, computer capabilities to store and analyze large datasets have improved dramatically. Fourth, there have been major initiatives to develop a spatial thinking among the social sciences [9]. Fifth, the importance of spatially targeted policies has been recognized in different areas [10-12]. The population ageing is the result of three interrelated variables: fertility, mortality and migration. Bangladesh contains an almost closed population due to lack of substantial population migration on regional or international scale, the main determinants of age structure is the course of fertility and mortality through time. Most of the studies on aging of Bangladesh population emphasized on certain characteristics of the old people [13]. Some of them are concerned with their economic, social, physical or health problems, and there is still dearth of research on particular aspect of population specially age structure and spatial aging [13]. The aim of this study is to assess the variation of aging process with respect to geographical areas of the country.

MATERIALS AND METHODS

This study uses the data from Bangladesh Bureau of Statistics (BBS). Division wise area and population size have been collected from provisional census report-2001 [14] and regional fertility and mortality statistics have been collected from the Sample Vital Registration System (SVRS) report-2002 [15]. Various aging measures: proportion of person age sixty and over (P_{60}), proportion of person age below15 years (P_{15}), aging index (AI) and Median age have been used to analyse the data.

Proportion of elderly (P_{60})

The ratio of the number of persons age 60 and over to the total population of a country at a certain time is known as proportion of elderly (P_{60}) . If $N(t)$, $N_{60}(t)$ is the total population and total number of person age 60 and over of a country at time t , then the proportion of elderly is defined as

$$P_{60} = \frac{N_{60}(t)}{N(t)}$$

Proportion of Children (P_{15})

The ratio of the number of person age below 15 to the total population of a country at a certain time is known as proportion of children. If $N(t)$, $N_{15}(t)$ is the total population and total number of person age below 15 of a country at time t , then the proportion of children is defined as

$$P_{15} = \frac{N_{15}(t)}{N(t)}$$

Aging Index (AI)

The ratio of the total number of persons age 60 and over to per 100 persons age below 15 is known as Aging index. If $N_{60}(t)$, $N_{15}(t)$ is the total number of person age 60 and over and the total number of person age below 15 of a country at time t , then the Aging Index is defined as

$$AI = \frac{N_{60}(t)}{N_{15}} \times 100$$

Median Age (Me)

The median age of a population is that age which divides a population into two groups of the same size such that half of the total population is younger than this age and the other half older. Median age (Me) is computed by using the formula

$$Me = L + \frac{\frac{N}{2} - F}{f} \times c$$

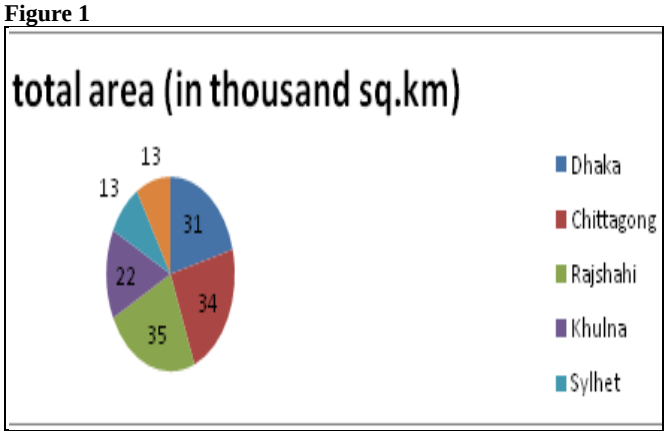
RESULTS AND DISCUSSION

Land area and density of population

Bangladesh is one of the most densely populated countries in the world. It is divided into seven administrative divisions. They are Dhaka, Chittagong, Rajshahi, Khulna, Sylhet, Barisal and Rangpur. Divisions are sub-divided into districts (zila). There are 64 districts in Bangladesh, each further subdivided into upazila. In this study it is considered only six divisions except Rangpur. The required data of Rangpur division is not available at that moment. The land area of Bangladesh is 148000 square kilometer and there are 839 people live in per square kilometer (BBS, 2003). Rajshahi

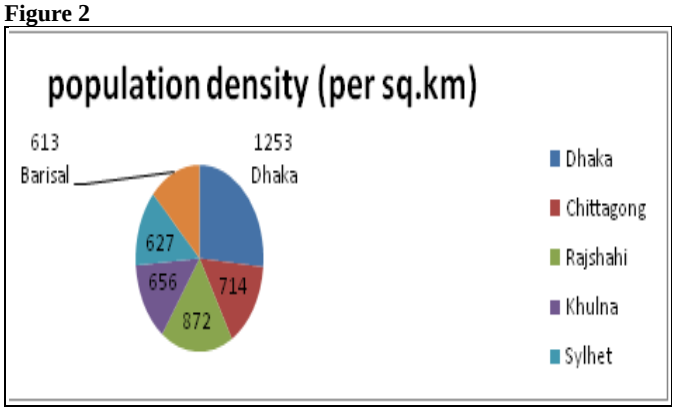
division is the largest while Sylhet division is the smallest according to land area (Figure 1).

Figure 1



On the other hand, the highest density of population is observed in Dhaka division and the lowest density is in the Barisal division (Figure 2).

Figure 2



The density of population in Dhaka division is almost more than double of Barisal division. This is because of working population move to Dhaka from different parts of the country for employment facilities. About 75 percent people live in Dhaka, Chittagong and Rajshahi division. So, there exists a division wise variation with respect to land area and population.

Vital Statistics

Dhaka and Barisal division have the lowest crude death rate (CDR) while Rajshahi division has the highest. A wide urban-rural variation of CDR is found among the divisions where CDR is lower in urban than rural. The highest crude birth rate (CBR) has been observed in Sylhet division while the lowest is in Barisal. Like CDR, there is also a variation of CBR in urban-rural areas of the divisions. The CBR is higher in rural than in urban. Like CBR, there is also found a variation of total fertility rate (TFR) among the divisions as well as urban and rural areas. The TFR is lower in urban than in rural. The highest TFR is observed in Sylhet and the lowest in Dhaka and Barisal division (Table 1).

Table1: Division wise Fertility and Mortality pattern in Bangladesh, 2000

	CDR			CBR			TFR		
Division	**Overall**	**Urban**	**Rural**	**Overall**	**Urban**	**Rural**	**Overall**	**Urban**	**Rural**
Dhaka	4.6	3.5	5.3	18.2	13.7	20.7	2.5	1.7	2.9
Chittagong	4.9	3.8	5.3	19.5	14.0	21.3	2.7	1.8	3.1
Rajshahi	5.1	3.7	5.5	19.5	13.5	21.4	2.7	1.6	2.9
Khulna	4.7	3.3	5.2.	19.0	13.3	21.0	2.6	1.6	2.7
Sylhet	4.9	3.7	5.2	19.8	14.5	21.0	2.9	1.9	3.0
Barisal	4.6	3.2	5.0	17.7	12.7	19.2	2.5	1.6	2.6
Bangladesh	5.1	3.8	5.4	20.1	16.6	21.0	2.6	2.1	2.7

Source: Sample and Vital Registration System 2002 [15]

Variation of aging process

According to aging measure (P_{60}), it is observed that Barisal and Rajshahi division have the highest and lowest proportion of elderly. According to proportion of person aged below 15 years (P_{15}), Sylhet and Chittagong division show the highest proportion of children. On the other hand, Khulna division shows the lowest proportion of children. Peak aging measure (P_{60}) and base aging measure (P_{15}) consider the elderly and children separately. But aging index (AI) considers the base and peak aging simultaneously. Khulna and Dhaka division shows the top aged region while Chittagong, Rajshahi and Sylhet division show the bottom aged region of Bangladesh according to aging index (AI). On the other hand Barisal division shows the middle position of aged region. According to median age, Khulna and Chittagong division shows the highest and lowest position of aging in Bangladesh. Dhaka and Rajshahi division show the second highest aged region of the country. The variation of aging may be due to transition of fertility and mortality.

Table 2: Division wise aging measures (P_{60}, P_{15}, AI, Median age) in Bangladesh Population, 2001

	Aging measures			
Division	**P_{60} (%)**	**P_{15} (%)**	**AI**	**Median age**
Dhaka	0.062	0.376	16.38	21.54
Chittagong	0.063	0.420	15.02	18.50
Rajshahi	0.057	0.376	15.08	21.40
Khulna	0.067	0.362	18.36	22.08
Sylhet	0.065	0.422	15.30	19.11

Barisal	0.072	0.411	17.55	19.85

Urban-rural variation

According to proportion of elderly (P_{60}), Barisal division shows the highest proportion of old in its urban-rural areas. On the other hand, the urban area of Dhaka division and rural area of Rajshahi division show the lowest proportion of old people. Rural has more elderly than urban in all divisions. Similarly, according to proportion of children (P_{15}), Urban and rural area of Sylhet and Chittagong division show the highest number of children. The urban area of Dhaka division and rural area of Khulna division shows the lowest proportion of children. The proportion of children is higher in rural than in urban area of all division. According to aging index (AI), rural area has more elderly than urban. The rural area of Khulna and the urban area of Barisal division show the top aged region in the country. The urban area of Dhaka division and the rural area of Khulna division show the highest position of aging area of the country. The urban area shows more aged than rural area according to median age (Table 3). So, it is clear from the analysis that there is a significant gap of aging process between urban-rural areas of each division in Bangladesh.

Table 3: Division wise aging measures with respect to locality in Bangladesh Population, 2001

Division	P_{60}		P_{15}		AI		Median age	
	Urban (%)	Rural (%)	Urban (%)	Rural (%)	Urban	Rural	Urban	Rural
Dhaka	0.043	0.071	0.317	0.404	13.87	17.33	22.97	20.51
Chittagong	0.051	0.067	0.369	0.437	13.85	15.35	20.72	17.78
Rajshahi	0.049	0.058	0.348	0.381	14.2	15.23	21.59	21.36
Khulna	0.054	0.070	0.337	0.368	15.91	18.92	22.62	21.93
Sylhet	0.055	0.066	0.369	0.430	14.76	15.36	21.12	18.78
Barisal	0.063	0.074	0.362	0.419	17.32	17.59	21.7	19.53

Gender variation

Male elderly is higher than female in all division showing Barisal is the highest and Rajshahi is the smallest according to aging measure, P_{60}. Male children are higher than their female counterpart in all divisions according to proportion of children (P_{15}). Regional variation of aging also exists with respect to sex where males are more aged than female except in Barisal division according to AI. Female aging is higher than male except Dhaka division according to median age (Table 4). Therefore it is clear that there exist a variation of aging process in each division with respect to gender.

Table 4: Division wise aging measures with respect to sex in Bangladesh Population, 2001

Division	P_{60}		P_{15}		AI		Median age	
	Male (%)	Female (%)	Male (%)	Female (%)	Male	Female	Male	Female
Dhaka	0.065	0.056	0.376	0.374	17.40	15.28	21.56	21.52
Chittagong	0.067	0.057	0.426	0.412	15.90	14.04	17.89	19.29
Rajshahi	0.060	0.052	0.379	0.360	15.54	14.55	20.70	21.90
Khulna	0.068	0.062	0.366	0.356	18.90	17.78	22.04	22.11
Sylhet	0.070	0.057	0.429	0.413	16.41	14.09	18.62	19.66
Barisal	0.080	0.062	0.422	0.397	15.71	19.09	19.09	20.65

CONCLUSION

There are 839 people live in per square kilometre of Bangladesh where as the highest density is observed in Dhaka city and the lowest in Barisal city. The highest TFR is observed in Sylhet division and the lowest is in Dhaka, Barisal and Khulna division. Barisal and Khulna division show the top aged region of the country. On the other hand, Rajshahi, Chittagong and Sylhet division show bottom aged region of the country. It is observed that the division with less TFR shows top aged region and division with high TFR shows bottom aged region. The rural areas of each division show more aged than urban areas. It is found that the proportion of male elderly is higher than female. Thus, it can be concluded that there exist a regional variation of aging with respect to density of population, TFR and Gender. The regional disparity of aging may be due to transition of fertility and mortality. The disparity of aging process will make a regional imbalance in health care services, local government and social welfare activities. Therefore, special attention should be given in budget allocation according to the regional disparity of aging in Bangladesh.

REFERENCES

1. Gershmel P. (2008). Teaching Geography, 2nd Edition. New York: *Guilford Publishing.*
2. Tobler, W. (1970). A Computer Movie Simulating Urban Growth in the Detroit

Region. *Economic Geography*, 46 (2): 234-240.
3. Voss P. R., Curtis, White K. J. and Hammer R. B. (2004). The (Re-) Emergence of Spatial Demography. CDE Working Paper No. 2004-04. *Center for Demography and Ecology*. University of Wisconsin, Madison.
4. Anselin, L. (1988). Spatial Econometrics: Methods and Models. Dordrecht; *Boston, Kluwer Academic Publishers.*
5. Entwisle, B. (2007). Putting People into Place. *Demography*, 44 (4): 687–703.
6. Weeks, J. R., A. Getis, A. G. Hill, M. S. Gadalla and T. Rashed (2004). The Fertility Transition in Egypt: Intra Urban Patterns in Cairo. *Annals of the Association of American Geographers*, 94 (1): 74-93.
7. Wachter, K. W. (2005). Spatial Demography. *Proceedings of the National Academy of Sciences of the United States of America*, 102 (43): 15299-15300.
8. Rey, S. J. and L. Anselin (2006). Recent Advances in Software for Spatial Analysis in the Social Sciences. *Geographical Analysis*, 38: 1-4.
9. Goodchild, M. F., L. Anselin, R. P. Appelbaum and B. H. Harthorn (2000). Toward Spatially Integrated Social Science. *International Regional Science Review*, 23 (2): 139-159
10. Fuchs, R. J. (1984). Government Policy and Population Distribution. In Clarke, J. I., (eds.), Geography and Population: Approaches and Applications: Oxford; New York, *Pergamon Press*: 127-137
11. Carter, R., K. N. Mendis and D. Roberts (2000). Spatial Targeting of Interventions against Malaria. *Bulletin of the World Health Organization*, 78(12), 1401-1411.
12. Bradshaw, T. K. and B. Muller (2004). Shaping Policy Decisions with Spatial Analysis. In Goodchild, M. F. and Janelle, D. G. (eds.), Spatially Integrated Social Science: examples in best practice: New York, *Oxford University Press*.
13. Elahi, K. M. (2003). The Age Structure and the Aged population in Bangladesh. PP. 165-179. In M. Kabir (eds.), Elderly Contemporary Issues (pp. 165-179). *Bangladesh Association of Gerontology (BAG), Dhaka.*
14. BBS (2003). Population ***Census*** Bangladesh ***2001***: National ***Report*** (***Provisional***). *Bangladesh Bureau of Statistics*. Dhaka: Planning. Division, Ministry of Planning, Government
15. *BBS (2004). Report* of *Sample Vital Registration System* (*SVRS*). *Bangladesh Bureau of Statistics (BBS)*. Dhaka: Planning. Division, Ministry of Planning, Government.

