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Original Article

Demographic Dependency of Aging Process in Bangladesh

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Abstract: The number of old age dependent people is increasing not only in developed countries but also in developing countries. The growth rate of elderly people is higher in rich countries than in poor countries. This study was an attempt to assess the demographic dependency of aging process using census data from Bangladesh Bureau of Statistics during the period of 1951 to 2011. From the analysis, a decreasing trend of young age dependency ratio (DR) as well as an increasing trend of the old age DR was observed. Overall, a downward trend in dependency burden of Bangladesh aging process has also been observed. A variation of DR have been observed in both urban and rural areas of the country. Rural areas hasvemore dependent people than urban areas. Male dependence is higher than their female counterpart. Non-Muslim communities have more old age dependence than Muslim communities. A declining pattern of young: old ratio has also been observed; the ratio is greater in urban areas than in rural areas.

Keywords: Demographic dependency, aging process and young-old ratio

1. INTRODUCTION

The process of ageing of populations is not limited to developed (i.e., high income) countries. The 'elderly dependency ratio' to the economically active population is on a steady increase even in under developed and developing countries (i.e., low income countries). However, the present and future elderly dependency ratios in developing countries are quite a bit smaller than those in rich countries.

The impacts of current population trend are reflected in the total dependency ratio (DR) and old age DR. The dependency ratio has a declining trend and the old age dependency has an increasing. These increasing trends of old age DR will have severe socio economic implication for the total population, especially on the elderly population of Bangladesh in the near future [1]. The consequences of unbalanced age structure may create socio-economic problem in the developing countries and thereby the excess of dependent population. This dependent population is measured by the 'dependency ratio' [2]. The 'dependency ratio' is the proportional relationship between active population and those of children and aged taken together. The relative faster increase in the proportion of the aged population will contribute a higher dependency ratio of population [3]. As fertility levels decline, the dependency ratio falls initially because the proportion of children decreases while the proportion of the population of working age increases. The period when dependency ratio declines is known as the "window of opportunity" because the society possesses a growing number of potential producers relative to the number of consumers.

Aging is the process of growing old. It is a biological process, experienced by the mankind in all times [4]. It generally deals with the age structure of population. It is a continuous, complex, and dynamic process that begins with birth and ends with death. And unless we die in our early years, each of us will grow old and experience the effects of aging process. The overall population begins to age as society moves from a condition of high rates of birth and death, to one of low rates of birth and death. The following pyramids show how emerging the elderly people increased during 1950 to 2050 (Fig. 1, 2).

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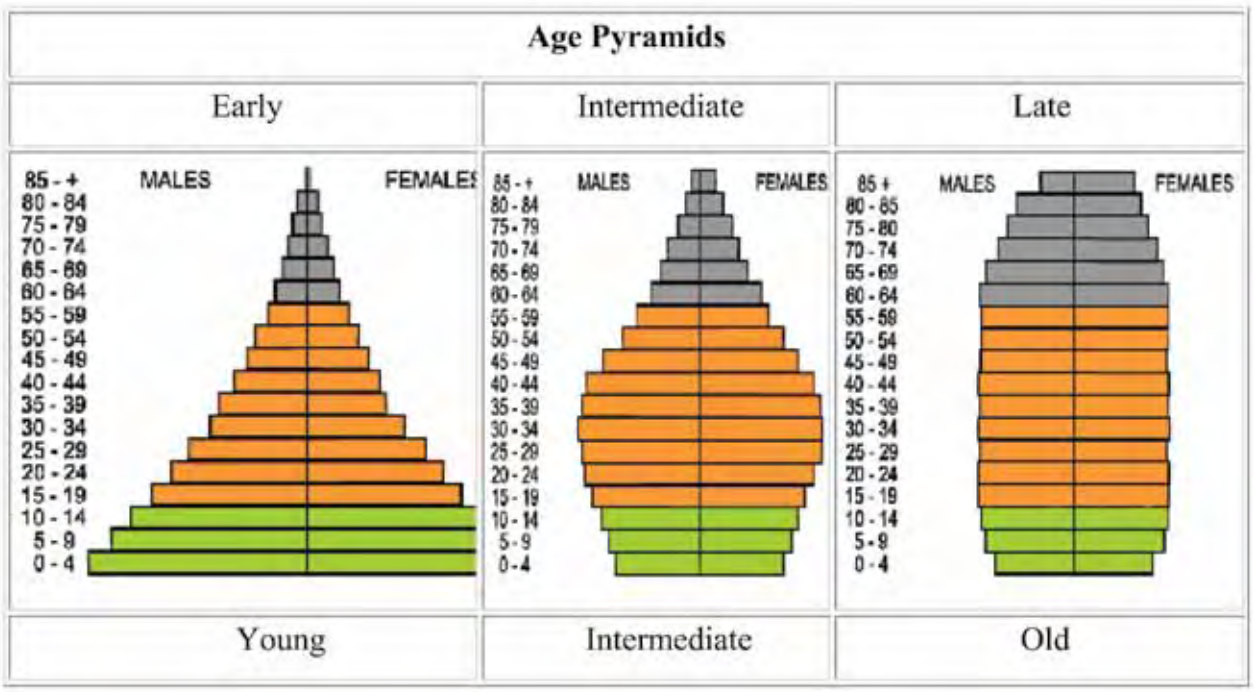

Fig. 1. The generalized age pyramids.

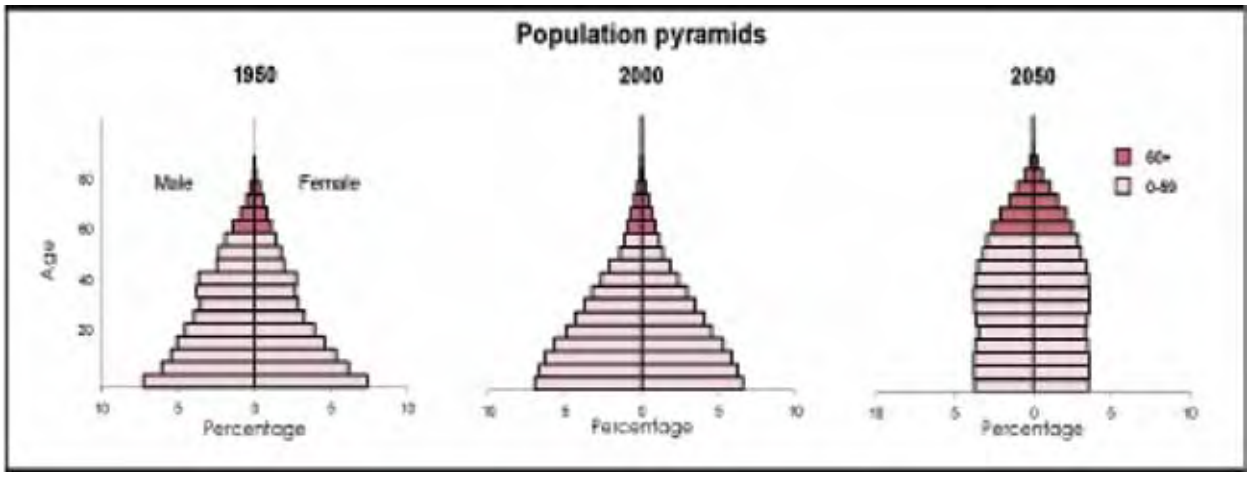

Fig. 2. Age pyramids of Bangladesh.

Source: World Population Ageing [5].

The rapid ageing of population and the growing cohorts of older persons have particular implications for the development of the country indicating increasing economic dependency and rising incidence of care giving to the aged by the traditional social unit, the family [6].

The demographic transition shows a very interesting change in the age composition of the population. These changes can be visualized using ‘age pyramids’.

From the above age pyramids, we observe that nations which are in the middle part of the demographic transition are potentially in a particularly favorable position as regards the economy, because they have a relatively large working age population. This situation however is transitory because this population will change to the type in the right pyramid: a reduced proportion of working age people and an enlarged proportion of elderly people.

Now an economy depends on those people who are in the age group 15–59 and while all members of the population are consumers, children and old people need to be supported by the working

age population (economically active population). The base aging (children) and peak aging (old people) is simultaneously termed as 'dependent population' or 'demographic burden' of the aging process. However, it should be remembered that in the agrarian societies children give a lot of help to their parents, and in modern industrialized societies older people may also help the economy by looking after the children or continuing to work.

When the proportion of older persons in the total population increases dramatically in a short period of time, it becomes particularly difficult for the social and economic institutions to adjust. An increasing proportion in the older ages necessarily affects the relative importance of the other segments. These changes in age composition can dramatically affect society's political, economic and social structure [7, 8]. Due to country's poverty and under development scenario with other demographic and socio-cultural changes, the emerging aged population will have severe economic consequences. These economically dependent elderly will become a burden on major portion of the working population [9]. The overall health conditions of the elderly were not good enough. The present state of health is significantly allied with their age, level of education, monthly income and proper sanitation facilities [10]. The elderly population is growing at a considerably faster rate and the life expectancies are increased with the advancement of medical science. The state has not yet develops the mechanisms to respond to the emerging ageing challenge [11]. The government should identify and assess the size of aged people in order to improve their socio economic condition [12]. The exact figure of demographic dependency will help to formulate proper policy and take decision for the government as well as stakeholders of the country. Therefore, comprehensive research is needed to assess the size, nature and overall population aging process of Bangladesh. The present study is an attempt to measure demographic dependency of aging process in Bangladesh.

2. MATERIALS AND METHODS

This paper uses population census data mainly from Bangladesh Bureau of Statistics (BBS), Sample surveys conducted by BBS for several census years, International Data Base (IDB), US Census Bureau and other related information during the period 1951-2011. Young age DR, Old age DR, Total DR and Young-old ratio were computed to asses the trend of demographic dependency for the aging process of Bangladesh. The ratios were also calculated with respect to locality (rural and urban), sex (male and female) and religious communities (i.e., Muslim and non-Muslim) for better understanding of the dependency pattern of the country.

2.1. Young Age Dependency Ratio (YDR)

The ratio between the number of persons of 0 –14 years per 100 persons to the number of persons of 15 –59 years is known as young age DR. If $N_{0-14}(t)$ and $N_{15-59}(t)$ are the number of person age between 0 and 14 and the number of person age between 15 and 59 of a country at time t, then the child DR is defined as:

$$YDR = \frac{N_{0-14}(t)}{N_{15-59}(t)} \times 100 \tag{1}$$

It is also known as youth DR or child DR. It provides a measure of the child population that is dependent on the general working age population. Again, the lower the value, the greater the potential of the community to support the dependent children. It also gives a better sense of the component of the total dependency rate attributable to the child population.

2.2. Old-Age Dependency Ratio (OADR)

The ratio between the number of persons of 60 years and above to the per 100 persons of 15–59 years is known as old age dependency ratio. If $N_{60}(t)$ and $N_{15-59}(t)$ is the number of persons age 60 years and over and the number of person age between 15 and 59 of a country at time t, then the old-age dependency ratio is defined as"

$$OADR = \frac{N_{60}(t)}{N_{15-59}(t)} \times 100 \tag{2}$$

It is an indirect measure of population aging. For convenience, working ages may be assumed to start at age 15. The ratio of the old-age dependent population to the economically active (working) population is also known as elderly dependency ratio, age-dependency ratio or elderly dependency burden and is used to assess intergenerational

transfers, taxation policies, and saving behavior [13]. As populations grow older, increases in old-age DR are indicators of the added pressures that social security and public health systems have to withstand.

2.3. Total Dependency Ratio (DR)

The ratio of the number of persons of age between 0 and 14 years plus the number of persons aged 60 and over to the per 100 persons age between 15 and 59 is known as the Total DR. If $N_{0-14}(t)$, $N_{60}(t)$ and $N_{15-59}(t)$ are the number of persons age between 0 and 14,the number of person aged 60 and over and the number of person age between 15 and 59 years in a country at time t, then the total DR is defined as:

$$DR = \frac{N_{15}(t) + N_{60}(t)}{N_{15-59}(t)} \times 100 \quad (3)$$

i.e., $DR = YDR + OADR$

Thus, total dependency ratio is the sum of young age DR and old-age DR. The lower the percentage, the greater the theoretical potential to support the young and old.

Dependency ratio is a crude measure because a significant number of young person as well as elderly persons are engaged in labour force and not dependent where others portion of working force may not be engaged in labour force at all [14]. The dependency ratio provides at best only a rough approximation of the actual dependency burden in a society [15].

2.4. Young-Old Ratio (YOR)

The ratio of the number of person age between 0 and 14 years to the per 100 persons aged 60 years and over is known as young-old ratio. If $N_{0-14}(t)$, $N_{60}(t)$ are the number of person age between 0 and 14 years and the number of person age 60 and over of a country at time t, then the young-old ratio is defined as

$$YOR = \frac{N_{0-14}(t)}{N_{60}(t)} \times 100 \quad (4)$$

3. RESULTS AND DISCUSSION

To study the nature and trend of demographic burden of Bangladesh population, various measures of DR have been computed and presented in Table 1-4. Some of the measures have been presented graphically for better understanding of dependent people of aging process in Bangladesh.

3.1. Demographic Dependency of Aging Process

The old age dependency ratio (OADR) shows a very slow increasing trend (Fig. 3). The OADR indicates the burden of elderly people per 100 economically active populations. The ratio was 8 in 1951 and then more or less 11 up to 2001. The child dependency ratio (CDR) shows an increasing trend from 1951 to 1974 and then a decreasing trend from 1981 to 2001 (Fig. 4). The young age dependency ratio (YDR) was 79 in 1951 and 104 in 2001. Like the YDR, the total dependency ratio (DR) shows an increasing trend from 1951 to 1974 and decreasing trend from 1981 to 2001 (Fig.4). The highest DR was 116 in 1974 and the lowest was 83 in 2001 (Table 1). Due to liberation war in 1971, active population may have died or baby boom may have happened. The decreasing trend of DR may be due to population aging at base.). A decreasing trend of the young-old ratio (YOR) has been observed over the study period except in 1991 (Fig. 5). The highest YOR was 950 in 1951 and the lowest was 481 in 2011 (Table 1).

Table 1. Trend of demographic dependency of aging process in Bangladesh**.**

Year	OADR	YDR	DR	YOR
1951	8.288328	78.77706	87.06539	950.4577
1961	10.72049	94.71855	105.439	883.5281
1974	12.27608	104.0093	116.2854	847.2517
1981	11.7869	97.56572	109.3526	827.7472
1991	11.01474	92.07012	103.0849	835.8809
2001	11.23712	72.12484	83.36196	641.8445
2011	12.15949	58.45447	70.61311	480.7311

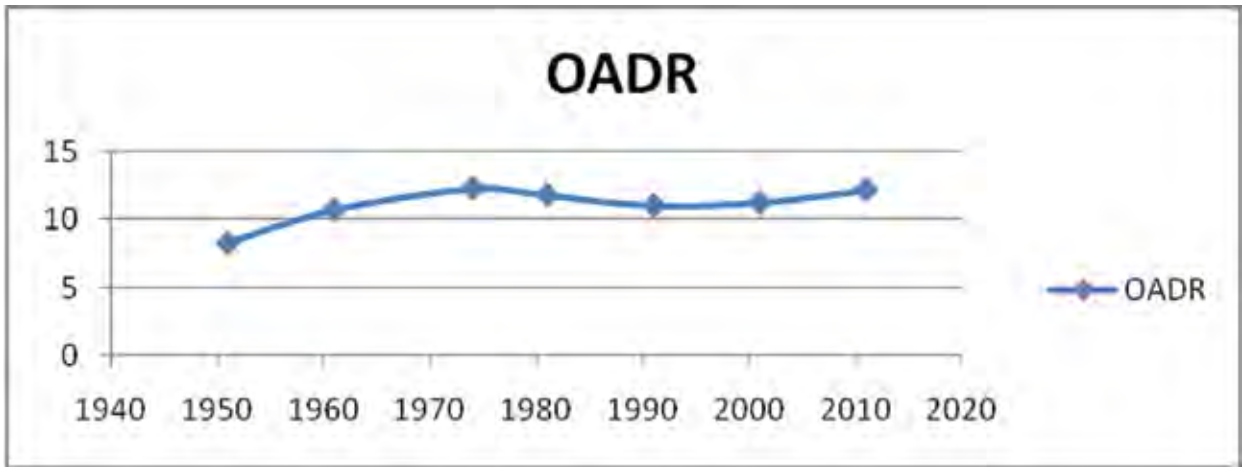

Fig. 3. Trend of OADR.

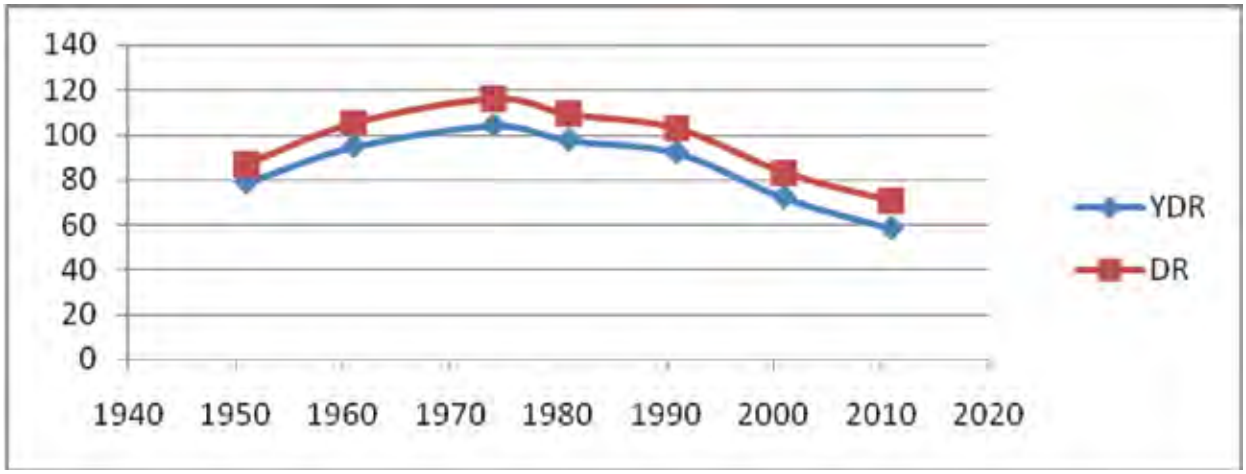

Fig. 4. Trend of YDR and DR.

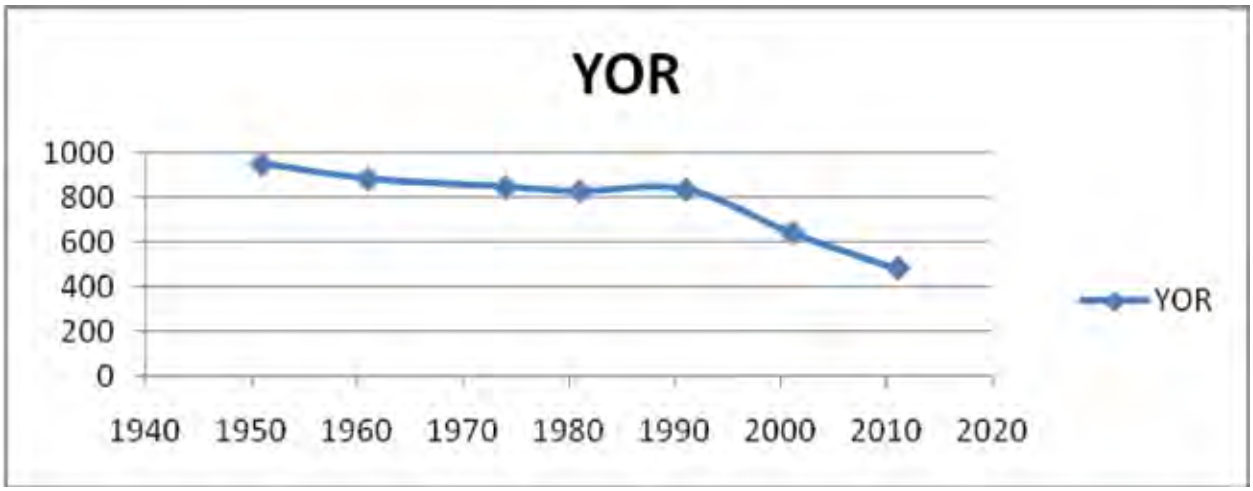

Fig. 5. Trend of young old ratio.

Table 2. Trend of demographic dependency of Bangladesh with respect to locality

Year	Locality	OADR	YDR	DR	YOR
1961	Urban	7.103064	76.81058	83.91365	1081.373
	Rural	10.94333	95.826	106.7693	875.6566
1974	Urban	7.979369	82.34223	90.3216	1031.939
	Rural	12.75166	106.4027	119.1544	834.4228
1981	Urban	9.182372	78.26272	87.44509	852.3148
	Rural	12.31553	101.5047	113.8202	824.2011
1991	Urban	6.883759	73.47073	80.35449	1067.305
	Rural	12.18685	97.34743	109.5343	798.7908
2001	Urban	7.794437	55.90592	63.70035	717.254
	Rural	12.43859	77.7851	90.22369	625.3532

The dependency ratio is likely to remain high till early in this century. This high total dependency has primarily been the result of a high proportion of children in the population and the aged population did not exert any major effect on the same [3].

3.2. Urban-rural Disparity in Dependency Ratio

Various measures of dependency with respect to locality have been presented in Table 2. Rural has more dependent people than urban over the study period according to measure OADR. Though the trend of the OADR is not clear but the urban-rural gap is significant (Fig. 6). A downward trend of the YDR has been observed in urban-rural sub population, except during 1974. Rural has more young dependent than urban (Fig. 7). This is because of higher fertility in rural than in urban areas. Like the YDR, the total dependency ratio (DR) shows a downward trend of urban-rural sub population (Fig. 8). Urban-rural gap of DR is large compared to OADR and YDR. Rural has more dependent people than urban accordingly. A decreasing trend of YOR has been observed for both urban and rural areas of the country except in 1991 (Table 2). The dependency burden is higher in rural areas than in urban areas because of latter's slightly more favourable age structure resulting from urban-rural migration of adult population [3].

3.3. Gender Disparity in Dependency Ratio

There is no specific trend of OADR of male population but shows decreasing trend of OADR of female population except before 1971. Male old age dependent is higher than female old age

Table 3. Trend of demographic dependency of Bangladesh with respect sex**.**

Year	Sex	OADR	YDR	DR	YOR
1951	Male	8.729414	78.29166	87.02108	896.8719
	Female	7.804604	79.30938	87.11398	1016.187
1961	Male	11.40563	94.01263	105.4183	824.2652
	Female	9.983221	95.47819	105.4614	956.3866
1974	Male	13.34342	102.4742	115.8177	767.9756
	Female	11.12091	105.6707	116.7916	950.1983
1981	Male	12.90943	97.87893	110.7884	758.197
	Female	10.60875	97.237	107.8457	916.5738
1991	Male	11.83989	93.9221	105.762	793.2686
	Female	10.16429	90.16133	100.3256	887.0404
2001	Male	12.34669	73.36424	85.71093	594.2015
	Female	10.10699	70.86247	80.96946	701.1236
2011	Male	12.91228	62.75462	75.66690	486.0073
	Female	11.48552	54.60450	66.09002	475.4204

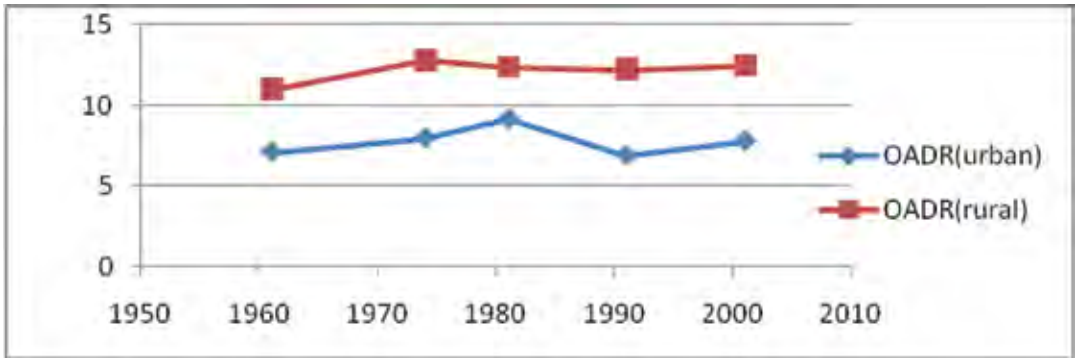

Fig. 6. Trend of OADR with respect to locality.

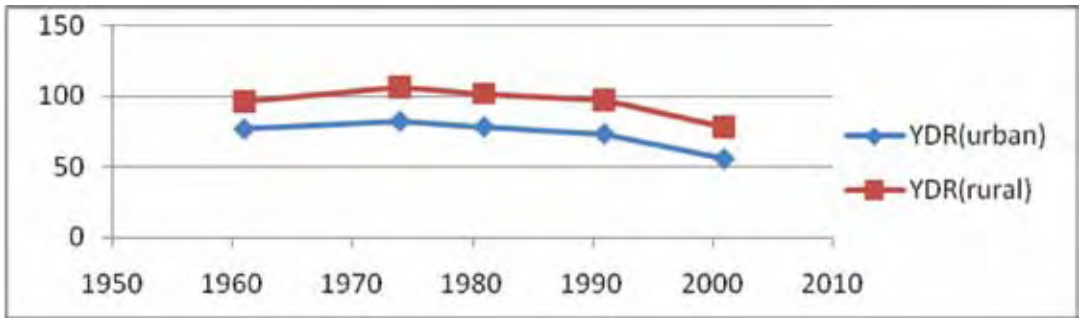

Fig. 7. Trend of YDR with respect to locality.

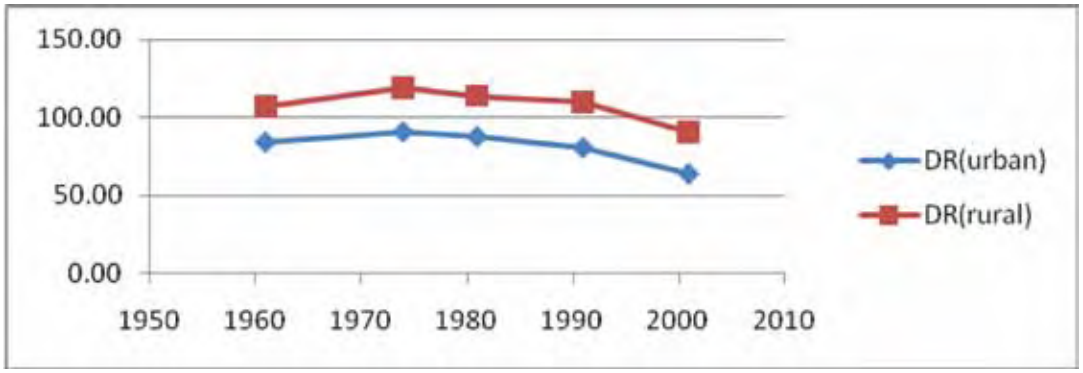

Fig. 8. Trend of DR with respect to locality.

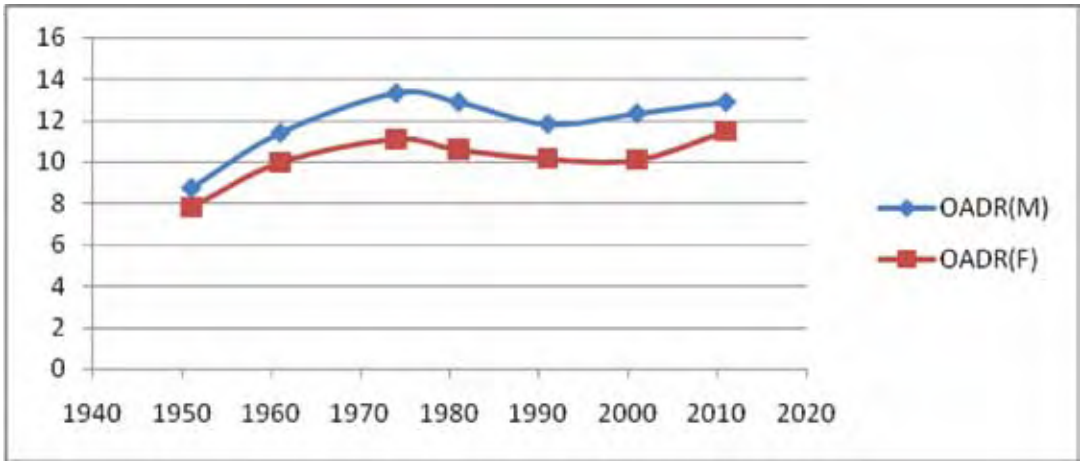

Fig. 9. Trend of OADR with respect to sex.

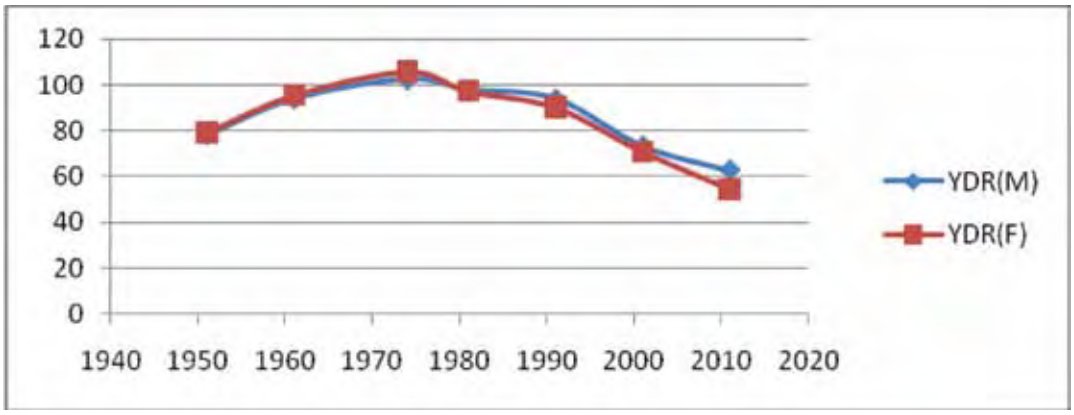

Fig. 10. Trend of YDR with respect to sex.

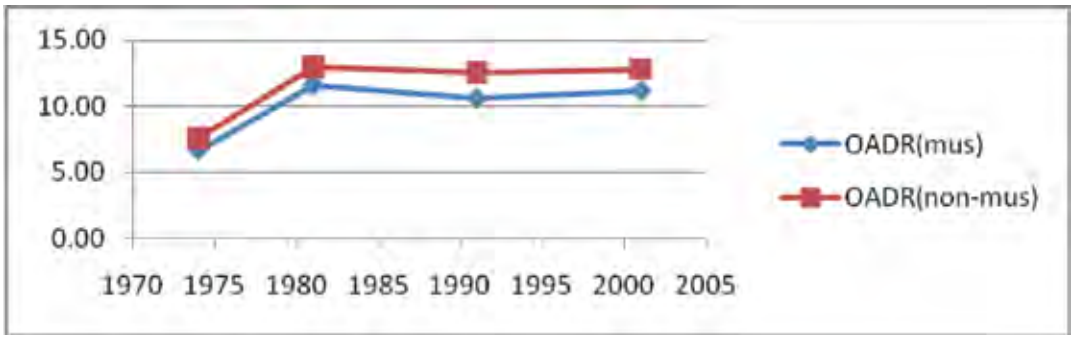

Fig. 11. Trend of OADR with respect to religious community.

dependent over the study period in Bangladesh according to measure OADR (Fig. 9). Thus male elderly needs more support than female. Like OADR, there is also a disparity in the young age dependency ratio (YDR) in male and female sub-population. A decreasing trend of both male and female YDR has been observed except in 1974 (Fig. 10). An increasing trend of total dependency ratio (DR) has been observed for both male and female sub population over the period 1951 to 1974. During this period (1951-1974) female are more dependent than male according to measure DR. On the other hand, a decreasing trend of DR has also been observed over the period 1981 to 2001 (Table 3). During this period (1981-2001), more female involved in working force than male and due to increasing female active population, the female DR is significantly decreased. A decreasing trend of YOR of male and female sub-population has been observed over the study period except in 1991 male population. Considering various measures of dependency, it can be concluded that population aging has no negative impact in Bangladesh, because Bangladesh is gaining demographic dividend from its population aging process.

3.4. Religious Disparity in Dependency Ratio

There may be a variation of demographic dependency in aging process with respect to religious communities (Muslim and non-Muslim). Our study also supports this claim. Various indicators regarding dependency have been presented in Table 4. A mentionable variation due to religious community was found in the OADR. The OADR is higher in non-Muslim community than in Muslim (Fig. 11). The dependency pattern is more or less same except in 1974. A decreasing trend of the YDR for both communities was observed in the country. The young age dependency ratio is higher in Muslim than non-Muslim community (Fig. 12). The total DR shows the similar pattern as that of CDR. The DR is greater in Muslim community than non-Muslim community. A decreasing trend of the YOR was observed for both Muslim and non-Muslim community. The YOR is higher in Muslim than non-Muslim community (Table 4). Therefore,

Table 4. Trend of demographic dependency with respect to religious community.

Year	Religious community	OADR	YDR	DR	YOR
1974	Muslim	6.693677	101.1304	107.824	1510.834
	Non-Muslim	7.61052	87.09196	94.70248	1144.363
1981	Muslim	11.58325	99.73407	111.3173	861.0198
	Non-Muslim	13.00068	84.36864	97.36931	648.9556
1991	Muslim	10.59094	93.07532	103.6663	878.8202
	Non-Muslim	12.56746	79.16731	91.73477	629.9387
2001	Muslim	11.17173	72.97494	84.14666	653.211
	Non-Muslim	12.83712	58.51401	71.35114	455.8187

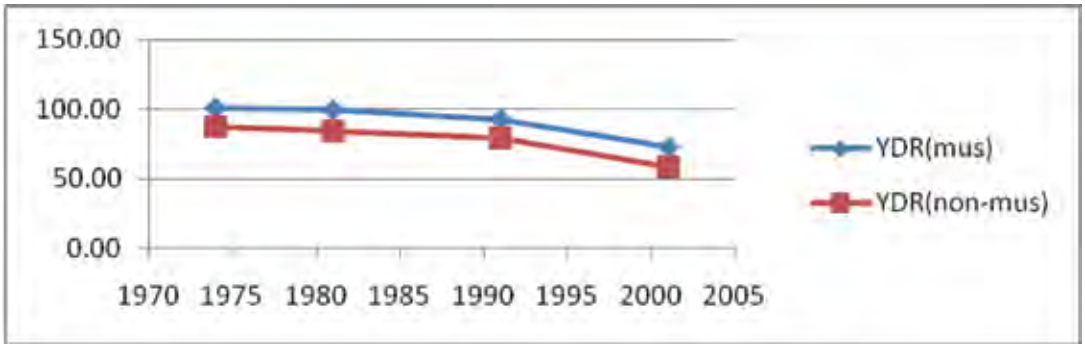

Fig. 12. Trend of YDR with respect to religious community.

from the above analysis, it can be concluded that the population aging has no negative impact on country's economy with respect to religious community.

4. CONCLUSIONS

The DR shows a decreasing trend over the studied time period. The highest dependency ratio was observed in 1974 and the lowest in 2011. This decreasing trend of DR may be due to population aging at the base. But in a developing country, like Bangladesh, many elderly people as well as children support their families. According to the old age dependency ratio, rural areas have more dependent population than urban. Non-Muslim community shows more old age dependent population than Muslim community. Therefore, it is concluded that population aging has a significant impact on demographic dependency. The Bangladesh government should take care of the situation of old age dependent people.

5. REFERENCES

1. Khan, M.M.H. The emerging aging situation in Bangladesh. *Bold* 17(2): 11-20 (2007).
2. Clarke, J. I. *Population Geography.* Pergamum, London (1968).
3. Elahi, K. M. The age structure and the aged population in Bangladesh. p. 165-179. In: *Elderly Contemporary Issues*, M. Kabir (Ed.). Bangladesh Association of Gerontology (BAG), Dhaka, Bangladesh (2003).
4. Goyal, R.S. Implications of demographic and economic transition for elderly: An illustration from India. *International Journal of Anthropology* 15(1-2): 19-34 (2000).
5. Anonymous. *World Population Ageing: 1950-2050*. Population Division, Department of Economic and Social Affairs, United Nations. doi: www.un.org/esa/population/publications/worldageing19502050/
6. Abedin, S. *Social and Health Status of the Aged Population in Bangladesh*, Paper 4. Centre for Policy Dialogue, Dhaka, Bangladesh (1999).
7. Walker, A. The economic burden of ageing and the prospect of intergenerational conflict. *Ageing and Soc*iety 10(4): 337-396 (1990).
8. Jackson, W. A. *Political Economy of Population Ageing*. Edward Elgar Publishing, Cheltenham,

United Kingdom (1998).
9. Kabir, M.H. Local level policy development to deal with the consequences of population aging in Bangladesh. *ESCAP Asian Population Studies Series* No. 131-A (1994).
10. Uddin, M.T., M.A.I. Chowdhury, M.N. Islam, & G.U. Baher. Status of elderly people of Bangladesh: Health perspective. *Proceedings of the Pakistan Academy of Sciences* 47(3): 181-189 (2010).
11. Rahman, M.M., M.I. Tareque, & K.M.M. Rahman. Living arrangements and health status of the rural elderly of Naogaon district, Bangladesh. *Indian Journal of Gerontology* 21(4): 378-393 (2007).
12. Abedin, S. Population aging in Bangladesh: Issues and perspectives. Summary of the country paper. *ESCAP, Asian Population Studies Series* No. 145 (1996).
13. Gavrilov, L.A. & P. Heuveline. Aging of population. In: *The Encyclopedia of Population*, P. Demeny & G. McNicoll (Eds.). Macmillan Reference, New York, USA (2003).
14. Smith, G. P. Legal and health care ethics for the elderly. Chapter 1, In: *Aging as a Phenomenon*. Taylor and Francis, USA (1996).
15. Taeuber, C. M. Sixty-five plus in America, In: *Current Population Reports*: *Special Studies*, p. 3-178. United States Bureau of Census, Washington, DC (1992).