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The Effects of Bangladesh Land Tenure System on Rural Elderly People of Naogaon District

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ABSTRACT

The goal of this paper is to assess the effects of Bangladesh land tenure system on the rural elderly people of Naogaon District. Most of the elderly population in Bangladesh largely depends solely on their lands for livelihood, particularly in the rural areas. At death, the lands of the deceased are often shared amongst the surviving sons. We examined the intergenerational process of transformation of land property from elderly father to sons using the Markov chain model. Results shows that father's agricultural, homestead, pond and other types of land will be stable after nine generations; six generations; 4 generations; and, seven generations respectively. Therefore, more work is needed to identify intergenerational process on the transfer of property of the elderly population to reflect on the changing national policies.

Keywords: Land, Bangladesh, Population, Markov.

INTRODUCTION

Both developing and developed countries of the world are facing global ageing of their population. As economic and social development occur, the proportion of the elderly in a population tends to increase due to declines in fertility and mortality rates; immigration and emigration patterns and longer life spans (Olson, 1990; Rice, 1996). Ageing is one of the emerging problems in Bangladesh. This problem has been gradually increasing with its far-reaching consequences (Rahman et al., 2007). According to Bangladesh Bureau of Statistics (BBS, 2001), the percentage of the elderly population is only 6.13. This number will reach 14.6 million (about 9 percent of the total population) by the year 2025 (Concepcion, 1987; East-West Center, 2002) and this percentage of the elderly population is projected to increase 17 percent by the year 2050 (WPP, 2006). The shift in age structure associated with population ageing has a profound impact on a broad range of economic, political and social conditions. For example, concerns are growing about the long-term viability of intergenerational social support systems, which are crucial for the well-being of both the older and younger generations (Cliquet and

Nizamuddin, 1999). As the impact of population ageing on the society's socio-economic conditions may be amplified by the speed with it occurs, it is important to consider not only the degree but also the pace of the changes in the age structure (Rahman et al., 2009). Furthermore, since relatively large shifts in age structures will be compressed into relatively short periods, developing countries will have less time than the developed ones to adapt to the challenges posed by population ageing (Mirkin and Weinberger, 2000; Sokolovsky, 2000; Grieco and Apt, 2001).

A significant part of the elderly population may become marginalized and limited in opportunity, both economically and in access to economic resources, housing, health care and the ability to participate in social and economic life. Consequently, population ageing may intensify intergenerational income disparities and thus exacerbate existing social inequalities within countries. The income disparities and social inequalities due to land transferring between intergeneration can create a significant problem in new dimension of population ageing. Land is one of the most important forms of resources protecting against old age poverty in rural Bangladesh. Land has some unique characteristics as a safer and more profitable investment for old age security in rural Bangladesh. In addition, land as a valuable asset controlled by the elderly, can provide old age security by acting as a credible leverage against non-supporting children. Although land played a very special role in meeting the demand for old age security but inheritance plays a major role in land access.

The basic traditional principles of land transfer from parents to children, as typically stated by informants, are simple. Children should receive land and other property as they approach adulthood and become economically independent. All children should receive some land if enough is available within the household. Parents tend to transfer land according to their perception of each child's ability and willingness to later reciprocate by providing old age care. Sons are typically given preference over daughters in land distribution and in this study only father's land quantity and those land of son that they got from their father are considered. Thus, it is essential to examine the pattern of land transferring of the elderly population. Keeping this reality in mind, this study is an attempt to examine the intergenerational transferring process of land property from elderly father to their son for the next future generation.

MATERIALS AND METHODS

This study uses the data collected from 7 villages of rural areas under Naogaon district, about 36 km away from Rajshahi divisional town of Bangladesh. One Thana named, Manda, was randomly selected from this district. From all the unions of the Thana, a Union (9 Number Tintulia Union Parishad) was randomly selected and from this union 7 villages were selected by using probability proportional to size (PPS) sampling. In order to perform the above task, first the authors made a pilot survey and collect voter list from Union Parishad and then identify seven villages out of 34 villages and collect the information of 743 elderly persons using Lahiri's method of PPS sampling. All the elderly (743 elderly) persons aged 60+ years residing in those seven villages were interviewed during September 6 to September 16, 2007. The data were edited, compiled, processed and analyzed by using SPSS 10.5 and MS-Excel program.

Markov chain model can help a probabilistic result of land property for the next future generation. It has been performed to find out the intergenerational process of land transferring from father to son.

In this study, we have defined the Markov chain $\{X_n\}$ in terms of land property. Here it is assumed that the land quantity of a son depends on the land quantity of father. Hence, intergenerational transformation of land property from father to son constitutes a first order Markov chain model.

We considered a Markov chain model with a finite number (4) of states with the state space S $\{s = 1,2,3,4\}$ respectively classification of agricultural land, homestead land, pond land and others type of land. Therefore, the probability matrix of agricultural land, homestead land, pond land and others type of land may be constructed as the $r \times c$ matrix. Father's agricultural land, homestead land, pond land and others type of land considered as rows and those of son are columns respectively. The mobility matrix of agricultural land, homestead land, pond land and others type of land can be represented in Table 1 and may be denoted as the form of the matrix notation.

Table 1: Mobility matrix of agricultural land, homestead land, pond land and others type of land

	Son					
	Class	C_1	C_2	C_3	C_4	Marginal Total
Father	C_1	n_{11}	n_{12}	n_{13}	n_{14}	$n_{1.}$
	C_2	n_{21}	n_{22}	n_{23}	n_{24}	$n_{2.}$
	C_3	n_{31}	n_{32}	n_{33}	n_{34}	$n_{3.}$
	C_4	n_{41}	n_{42}	n_{43}	n_{44}	$n_{4.}$
	Marginal Total	$n_{.1}$	$n_{.2}$	$n_{.3}$	$n_{.4}$	Grand Total

Notes: C_1, C_2, C_3 & C_4 *represent the categories of agricultural land, homestead land, pond land and others type of land*

Dividing each row by corresponding row total, we can get the matrix of transition probabilities as below:

$$P = [\, p_{ij} \,] = \begin{pmatrix} P_{11} & P_{12} & P_{13} & P_{14} \\ P_{21} & P_{22} & P_{23} & P_{24} \\ P_{31} & P_{32} & P_{33} & P_{34} \\ P_{41} & P_{42} & P_{43} & P_{44} \end{pmatrix}$$

RESULTS AND DISCUSSIONS

(a) Mobility Matrix: Agricultural Land

From the classification of agricultural land of father and son, we have presented a simple cross tabulation of entire respondents. This is the mobility matrix of agricultural land. The process and the direction of agricultural land mobility have been presented in Table 2.

From the marginal total of row and column, presented in Table 2, it is observed that there is a distinct pattern of social polarization. Apparently, it is found that for father classes, 405 fathers are belonging to no land group while 560 sons are belonging to no land group. 124 fathers are belonging to land quantity in between 1 to 50 decimal while 80 sons are belonging to this category. 126 fathers are belonging to the land group in between 51 to 250 decimal while 82 sons are in this group. 88 fathers are belonging to land group 250+ decimal while the corresponding figure for son is only 21. So, it may be concluded that father's land property is comparatively much higher than that of son.

Table 2: Mobility matrix according to agricultural land

		Son's agricultural land (in Decimal)				**Marginal Total**
Father's agricultural land (in Decimal)	**Class**	No land	1 – 50	51 - 250	250+	
	No land	324	34	39	8	405
	1 – 50	99	11	10	4	124
	51 – 250	83	20	18	5	126
	250+	54	15	15	4	88
	Marginal Total	560	80	82	21	743

(b) Transition Probabilities and Markov Matrices

The first generation transition is the conditional probabilities that a son's land quantity will be no land, 1 to 50 decimal, 51 to 250 decimal and 250+ decimal given that his father's land quantity was no land, 1 to 50 decimal, 51 to 250 decimal and 250+ decimal. These probabilities are obtained from the mobility matrix of Table 2, dividing element of rows by corresponding marginal total.

The transition between size classes of the successive generation in a quantity of agricultural land level may be regarded as transition of a Markov chain of first order with the observed transition (conditional) probabilities. The transition probability matrix is given in the Table 3. The main diagonal elements of Table 3 indicate that a father was in state i and his son remains in state i. From our study it is seen that the probability of a son has no agricultural land given that his father had no agricultural land too is 0.800 and the corresponding figure for agricultural land quantity 1-50, 51-250 and 250+ decimal are 0.088, 0.142 and 0.045 respectively.

The off diagonal elements of Table 3 indicate that the probability of transition of upward or downward mobility according to above the diagonal or beneath the diagonal elements. The conditional probability that a son has no agricultural land given that his father's agricultural land quantity were 1-50, 51-250 and 250+ decimal are 0.798, 0.658 and 0.613 respectively. The conditionality probability that a son has agricultural land quantity in between 1 to 50 decimal given that his father's land quantity were no land, 51-250 and 250+ decimal are 0.083, 0.158, and 0.170 respectively. The conditional probability that a son has agricultural land quantity in between 51 to 250 decimal given that his father has no land, 1-50 and 250+ decimal are 0.096, 0.080 and 0.170 respectively. The conditional probability that a son has agricultural land more than 250 decimal given that his father has no land, 1-50, 51-250 decimal are 0.019, 0.032 and 0.039 respectively.

Table 3: Intergenerational transition probability matrix of agricultural land

Father's agricultural land (in Decimal)	Son's agricultural land (in Decimal)				
	Class	No land	1 – 50	51 – 250	250+
	No land	0.800	0.083	0.096	0.019
	1 – 50	0.798	0.088	0.080	0.032
	51 – 250	0.658	0.158	0.142	0.039
	250+	0.613	0.170	0.170	0.045

(c) Limiting Behaviours of Transition Probability

The limiting behaviour of transition matrix has been shown in Table 4. Given that a father has functionally no agricultural land, the probability that his son will have functionally no agricultural land is 0.800 and in 2nd generation his grandson will have functionally no agricultural land is 0.781. Similar interpretation could be given for agricultural land quantity 1-50, 51-250 and 250+ decimal and the corresponding probabilities are 0.088 to 0.092; 0.142 to 0.102 and 0.045 to 0.025 respectively. It is further seen that the probability remaining in the same category of agricultural land quantity decrease from no land to 1-50 decimal and also 1-50 decimal to 250+ decimal. The important finding is that the agricultural land quantity in between 1 to 50 decimal is less likely to have same size category in the next successive generations than that of no land and also land quantity more than 250 decimal is less likely to have same size category in the next successive generations than that of 1-50 decimal.

Results displayed in Table 4 shows that the limiting value $\underset{n\to\infty}{Lim} P^n$ is equivalent to P^9 which implies that the Markov chain will occupy any state which is independent of the initial state and the size classes structure will be stable after 9 generations. In other words, if a level starts initially at any state of agricultural land category, after 9 generations the probability that the next generations will belong in no land, 1-50 decimal, 51-250 decimal and 250+ decimal is 0.760, 0.090, 0.098 and 0.022 respectively. For n = 9 or more, no further change in transition probability is observed express that socio-economic conditions remain unaltered. Since agricultural land is a vital development factor especially in agrarian Bangladesh, it may be concluded that the father will have no land to transfer to their son after nine generation. So, appropriate policy is firmly needed in this regard.

Table 4: Limiting behaviours of transition probability: agricultural land

N	P			
2	0.781	0.092	0.100	0.022
	0.780	0.092	0.100	0.022
	0.769	0.097	0.102	0.025
	0.765	0.100	0.104	0.025
3	0.777	0.092	0.100	0.022
	0.776	0.092	0.100	0.022
	0.774	0.092	0.100	0.022
	0.775	0.092	0.100	0.022
4	0.774	0.092	0.099	0.022
	0.773	0.092	0.099	0.022
	0.771	0.091	0.099	0.022
	0.772	0.091	0.099	0.022
5	0.771	0.091	0.099	0.022
	0.770	0.091	0.099	0.022
	0.768	0.091	0.099	0.022
	0.768	0.091	0.099	0.022
6	0.768	0.091	0.099	0.022
	0.767	0.091	0.098	0.022
	0.765	0.091	0.098	0.022
	0.765	0.091	0.098	0.022
7	0.765	0.091	0.098	0.022
	0.764	0.090	0.098	0.022
	0.762	0.090	0.098	0.022
	0.762	0.090	0.098	0.022
8	0.762	0.090	0.098	0.022
	0.760	0.090	0.098	0.022
	0.760	0.090	0.098	0.022
	0.760	0.090	0.098	0.022
9	0.760	0.090	0.098	0.022
	0.760	0.090	0.098	0.022
	0.760	0.090	0.098	0.022
	0.760	0.090	0.098	0.022

(d) Mobility Matrix: Homestead Land

From the classification of homestead land of father and sons a simple cross tabulation of entire respondents has been shown as the mobility matrix of homestead land. The process and the direction of homestead land mobility are presented in Table 5.

This table could be explained in the same manner as Table 2. Apparently, it is found that for father classes 337 fathers are belonging to no land group while 602 sons are belonging to no land group. Thus it may be concluded that father’s homestead land property is comparatively much higher than that of son.

Table 5: Mobility matrix according to homestead land

Father's homestead land (in Decimal)	Son's homestead land (in Decimal)					Marginal Total
	Class	No land	1 - 10	11 - 30	30+	
	No land	237	67	22	11	337
	1 – 10	194	20	1	2	217
	11 – 30	108	4	4	0	116
	30+	63	2	2	6	73
	Marginal Total	602	93	29	19	743

(e) Transition Probabilities and Markov Matrices

The first generation transition is the conditional probabilities that a son's homestead land quantity will be no land, 1 to 10 decimal, 11 to 30 decimal and 30+ decimal given that his father's homestead land quantity was no land, 1 to 10 decimal, 11 to 30 decimal and 30+ decimal. These probabilities are obtained from the mobility matrix of Table 5, dividing each element of rows by corresponding marginal total.

From Table 6 it is seen that the probability of a son has no homestead land given that his father had no homestead land too is 0.703 and the corresponding figure for homestead land quantity 1-10, 11-30 and 30+ decimal are 0.092, 0.034 and 0.082 respectively. The off diagonal elements of Table 6 indicate that the probability of transition of upward or downward mobility according to above the diagonal or beneath the diagonal elements. The conditional probabilities that a son has no homestead land given that his father's homestead land quantity was 1-10, 11-30 and 30+ decimal are 0.894, 0.931 and 0.863 respectively.

The conditionality probability that a son has homestead land quantity in between 1 to 10 decimal given that his father's land quantity were no land, 11-30 and 30+ decimal are 0.199, 0.034 and 0.027 respectively. The conditional probability that a son has homestead land quantity in between 11 to 30 decimal given that his father has no land, 1-10 and 30+ decimal are 0.065, 0.005 and 0.027 respectively. The conditional probability that a son has homestead land more than 30 decimal given that his father has no land, 1-10, 11-30 decimal are 0.033, 0.009 and 0.000 respectively.

Table 6: Intergenerational transition probability matrix of homestead land

Father's homestead land (in Decimal)	Son's homestead land (in Decimal)				
	Class	No land	1 – 10	11 – 30	30+
	No land	0.703	0.199	0.065	0.033
	1 – 10	0.894	0.092	0.005	0.009
	11 – 30	0.931	0.034	0.034	0.000
	30+	0.863	0.027	0.027	0.082

(f) Limiting Behaviours of Transition Probability

The limiting behaviour of transition matrix is given in Table 7. Given that a father has functionally no homestead land, the probability that his son will have functionally no homestead land is 0.703 and in the second generation his grandson will have functionally no homestead land is 0.761. Similar interpretation could be given for homestead land quantity 1-10, 11-30 and 30+ decimal and the corresponding probabilities are 0.092 to 0.187, 0.034 to 0.062 and 0.082 to 0.035 respectively. It is further seen that the probability remaining in the same category of homestead land quantity decrease from no land to 1-10 decimal, 1-10 decimal to 11-30 decimal and also 1-10 decimal to 30+ decimal. The main finding is that the homestead land quantity in between 1 to 10 decimal is less likely to have same size category in the next successive generations than that of no land, land quantity 11-30 decimal is less likely to have same size category in the next successive generations than that of 1-10 decimal and also land quantity more than 30 decimal is less likely to have same size category in the next successive generations than that of 1-10 decimal.

Results displayed in Table 7 indicates that the limiting value $\underset{n\to\infty}{Lim} P^n$ is equivalent to P^6 which implies that the Markov chain will occupy any state which is independent of the initial state and the size classes structure will be stable after 6 generations. In other words, if a level starts initially at any state of homestead land category, after 6 generations the probability that the next generation will belong in no land, 1-10 decimal, 11 - 30 decimal and 30+ decimal is 0.752, 0.167, 0.052 and 0.029 respectively. For n = 6 or more, no further change in transition probability is observed shows that socio-economic conditions remain unaltered. Homestead land is very much important to explain the status of a person in a society. But in this study it is found that after six generation the fathers will have no homestead land to transfer to their sons, which may create a large problem for the society. So, policy in this situation is urgently needed.

Table 7: Limiting behaviours of transition probability: homestead land

N	P			
2	0.761	0.161	0.050	0.028
	0.723	0.187	0.059	0.031
	0.716	0.189	0.062	0.031
	0.727	0.177	0.059	0.035
3	0.750	0.169	0.053	0.029
	0.757	0.164	0.051	0.028
	0.757	0.163	0.050	0.028
	0.754	0.164	0.051	0.028
4	0.753	0.167	0.052	0.029
	0.750	0.168	0.052	0.029
	0.749	0.168	0.052	0.029
	0.748	0.168	0.052	0.029
5	0.752	0.168	0.052	0.029
	0.751	0.167	0.052	0.029
	0.750	0.167	0.052	0.029
	0.749	0.167	0.052	0.029
6	0.752	0.168	0.052	0.029
	0.751	0.167	0.052	0.029
	0.750	0.167	0.052	0.029
	0.749	0.167	0.052	0.029

(g) Mobility Matrix: Pond Land

From the classification of pond land of father and son we have presented a simple cross tabulation of entire sample size has been presented in Table 8 as the mobility matrix of pond land.

From the marginal total of row and column, presented in Table 8, it is found that there is a distinct pattern of social polarization. Apparently, it is observed that for father classes 661 fathers are belonging to no land group while 736 sons are remain in this category. Fathers are belonging to pond land in between 1 to 10 decimal is only 48 and the corresponding figure for son is only 2. Only 14 fathers remain in the pond land quantity in between 11 to 30 decimal while only 4 sons are in this group. 20 fathers are belonging to the pond land quantity above 30 decimal while only one son remains in this land category. Therefore, it may be concluded that father's pond land property is comparatively much higher than that of son.

Table 8: Mobility matrix according to pond land

Father's pond land (in Decimal)	Son's pond land (in Decimal)					Marginal Total
	Class	No land	1 - 10	11 - 30	30+	
	No land	656	0	4	1	661
	1 – 10	46	2	0	0	48
	11 – 30	14	0	0	0	14
	30+	20	0	0	0	20
	Marginal Total	736	2	4	1	743

(h) Transition Probabilities and Markov Matrices

The first generation transition is the conditional probabilities that a son's pond land quantity will be no land, 1 to 10 decimal, 11 to 30 decimal and 30+ decimal given that his father's pond land quantity was no land, 1 to 10 decimal, 11 to 30 decimal and 30+ decimal. These probabilities are obtained from the mobility matrix of Table 8, dividing elements of rows by corresponding marginal total.

The transition between size classes of the successive generation in a quantity pond land level may be regarded as transition of a Markov chain of first order with the observed transition (conditional) probabilities. The transition probability matrix is given in Table 9 from which it is seen that the probability of a son has no pond land given that his father had no pond land too is 0.992 and the corresponding figure for pond land quantity 1-10, 11-30 and 30+ decimal are 0.042, 0.000 and 0.000 respectively. The conditional probabilities that a son has no pond land given that his father's pond land quantity was 1-10, 11-30 and 30+ decimal are 0.958, 1.000 and 1.000 respectively. The conditionality probability that a son has pond land quantity in between 1 to 10 decimal given that his father's land quantity were no land, 11-30 and 30+ decimal are 0.000, 0.000 and 0.000 respectively. The cond0.itional probability that a son has pond land quantity in between 11 to 30 decimal given that his father has no land, 1-10 and 30+ decimal are 0.006, 0.000 and 0.000 respectively. The conditional probability that a son has pond land more than 30 decimal given that his father has no land, 1-10, 11-30 decimal are 0.001, 0.000 and 0.000 respectively.

Table 9: Intergenerational transition probability matrix of pond land

	Son's pond land (in Decimal)				
Father's pond land (in Decimal)	**Class**	No land	1 – 10	11 – 30	30+
	No land	0.992	0.000	0.006	0.001
	1 – 10	0.958	0.042	0.000	0.000
	11 – 30	1.000	0.000	0.000	0.000
	30+	1.000	0.000	0.000	0.000

(i) Limiting Behaviours of Transition Probability

The limiting behaviours of transition matrix is presented in Table 10. Given that a father's pond land quantity is functionally zero, the probability that his son will have functionally no pond land is 0.992 and in the 2nd generation his grandson will have functionally no pond land is 0.991. Similar interpretation could be given for pond land quantity 1-10, 11-30 and 30+ decimal and the corresponding probabilities are 0.042 to 0.002, 0.000 to 0.006 and 0.000 to 0.001 respectively. It is further seen that the probability remaining in the same category of pond land quantity decrease from no land to 1-10 decimal and 1-10 decimal to 11-30 decimal. An important conclusion is that the pond land quantity in between 1 to 10 decimal is less likely to have same size category in the next successive generations than that of no land and also land quantity in between 11 to 30 decimal is less likely to have same size category in the next successive generations than that of 1-10 decimal.

Results displayed in Table 10 declares that the limiting value $\underset{n\to\infty}{Lim} P^n$ is equivalent to P^4 which implies that the Markov chain will occupy any state which is independent of the initial state and the size classes structure will be stable after 4 generations. In other words, if a level starts initially at any state of pond land category, after 4 generations the probability that the next generation will be in no land, 1-10 decimal, 11-30 decimal and 30+ decimal is 0.989, 0.000, 0.006 and 0.001 respectively. Pond land has an outstanding socio-environmental impact. But in this study it is seen that, after four generation the fathers will have no pond land to transfer to their sons, which may create a dramatic changes in the socio-environmental situation. Hence, proper steps should be needed to protect the pond land sharing.

Table 10: Limiting behaviours of transition probability: pond land

N	P			
2	0.991	0.000	0.006	0.001
	0.990	0.002	0.006	0.001
	0.992	0.000	0.006	0.001
	0.992	0.000	0.006	0.001
3	0.990	0.000	0.006	0.001
	0.990	0.000	0.006	0.001
	0.990	0.000	0.006	0.001
	0.990	0.000	0.006	0.001
4	0.989	0.000	0.006	0.001
	0.989	0.000	0.006	0.001
	0.990	0.000	0.006	0.001
	0.990	0.000	0.006	0.001

(j) Mobility Matrix: Other Types of Land

From the classification of other types of land (the land quantity outside the three categories described earlier) of father and son we have presented a simple cross tabulation of entire sample size has been presented in Table 11 as the mobility matrix of other types of land.

Apparently, it is observed that for father classes 735 fathers are belonging to no land group while 741 sons are remain in this category. 4 fathers are belonging to land quantity in between 1 to 10 decimal while 2 sons are remaining in this category. Only 2 fathers remain separately in other types of land quantity in between 11 to 30 decimal and 30+ decimal while no sons are belonging in both of this land category respectively. So, it may be concluded that father's other types land property is comparatively much higher than that of son.

Table 11: Mobility matrix according to other types of land

Father's other types of land (in Decimal)	Son's other types of land (in Decimal)					Marginal Total
	Class	No land	1 - 10	11 - 30	30+	
	No land	734	1	0	0	735
	1 – 10	3	1	0	0	4
	11 – 30	2	0	0	0	2
	30+	2	0	0	0	2
	Marginal Total	741	2	0	0	743

(k) Transition Probabilities and Markov Matrices

The first generation transition is the conditional probabilities that a son's other types land quantity will be no land, 1 to 10 decimal, 11 to 30 decimal and 30+ decimal given that his father's land quantity was no land, 1 to 10 decimal, 11 to 30 decimal and 30+ decimal. These probabilities are obtained from the mobility matrix of Table 11, dividing elements of rows by corresponding marginal total.

The transition between size classes of the successive generation in a quantity of others type of land level may be regarded as transition of a Markov chain of first order with the observed transition (conditional) probabilities. From the transition probability matrix it is seen that the probability of a son has no other types of land given that his father had no other types of land too is 0.998 and the corresponding figure for other types of land quantity 1-10, 11-30 and 30+ decimal are 0.250, 0.000 and 0.000 respectively. The conditional probability that a son has no other types of land given that his father's other types land quantity were 1-10, 11-30 and 30+ decimal are 0.750, 1.000 and 1.000 respectively. The conditionality probability that a son has other types of land quantity in between 1 to 10 decimal given that his father's other types land quantity were no land, 11-30 and 30+ decimal are 0.001, 0.000 and 0.000 respectively. Again the conditional probability that a son has other types of land quantity in between 11 to 30 decimal given that his father has no land, 1-10 and 30+ decimal are 0.000, 0.000 and 0.000 respectively. The conditional probability that a son has other types of land more than 30 decimal given that his father has no land, 1-10, 11-30 decimal are 0.000, 0.000 and 0.000 respectively.

Table 12: Intergenerational transition probability matrix of other types of land

	Son's other types of land (in Decimal)				
Father's other types of land (in Decimal)	**Class**	No land	1 – 10	11 – 30	30+
	No land	0.998	0.001	0.000	0.000
	1 – 10	0.750	0.250	0.000	0.000
	11 – 30	1.000	0.000	0.000	0.000
	30+	1.000	0.000	0.000	0.000

(L) Limiting Behaviours of Transition Probability

The limiting behaviour of transition matrix is given in Table 13. Given that a father's other types of land quantity is functionally zero, the probability that his son will have functionally no other types of land is 0.998 and in the 2nd generation his grandson will have functionally no other types of land is 0.996. Similar interpretation could be given for other types of land quantity 1-10, 11-30 and 30+ decimal and the corresponding probabilities are 0.250 to 0.063; 0.000 to 0.000 and 0.000 to 0.000 respectively. It is further seen that the probability remaining in the same category of others type of land quantity decrease from no land to 1-10 decimal and 1 to 10 decimal to 11-30 decimal. The important finding is that the other types of land quantity in between 1 to 10 decimal is less likely to have same size category in the next successive generations than that of no land and also land quantity in between 1 to 10 decimal is less likely to have same size category in the next successive generations than that of 11-30 decimal.

Results displayed in Table 13 exerts that the limiting value $\underset{n\to\infty}{Lim} P^n$ is equivalent to P^7 which implies that the Markov chain will occupy any state which is independent of the initial state and the size classes structure will be stable after 7 generations. In other words, if a level starts initially at any state of others type of land category, after 7 generations the probability that the next generation will be in no land, 1-10 decimal, 11-30 decimal and 30+ decimal is 0.992, 0.001, 0.000 and 0.000 respectively. As the time passes other types of land property decreases and after seven generation, the fathers will have no other types of land to transfer to their sons. This will surely affect the developmental process of the country. So, legal authority should pay great attention to protect other types land sharing of the respondents.

Table 13: Limiting behaviours of transition probability: other types of land

N	P			
2	0.996	0.001	0.000	0.000
	0.936	0.063	0.000	0.000
	0.998	0.001	0.000	0.000
	0.998	0.001	0.000	0.000
3	0.995	0.001	0.000	0.000
	0.981	0.017	0.000	0.000
	0.997	0.001	0.000	0.000
	0.997	0.001	0.000	0.000
4	0.994	0.001	0.000	0.000
	0.992	0.005	0.000	0.000
	0.996	0.001	0.000	0.000
	0.996	0.001	0.000	0.000
5	0.993	0.001	0.000	0.000
	0.994	0.002	0.000	0.000
	0.995	0.001	0.000	0.000
	0.995	0.001	0.000	0.000
6	0.992	0.001	0.000	0.000
	0.993	0.001	0.000	0.000
	0.994	0.001	0.000	0.000
	0.994	0.001	0.000	0.000
7	0.992	0.001	0.000	0.000
	0.993	0.001	0.000	0.000
	0.993	0.001	0.000	0.000
	0.993	0.001	0.000	0.000

CONCLUSIONS AND RECOMMENDATIONS

The ageing situation should get due attention not only from the demographic angle but in all the sphere of the economy and social welfare especially nowadays that the country swings at different levels in the continuum of tradition and modernity (Randhawa, 1991). Due to the lack of the social security programs and security of private property rights in traditional Bangladesh communities, it is increasingly difficult for families to support the elderly especially in the rural areas.

Bangladesh is one of the world’s most densely populated nations and most of its people particularly in rural areas live in extreme poverty, where land property played a special role in meeting the demand for their livelihood. The availability of lands for effective transfer from fathers to sons are becoming smaller as generation passes and the population increases. In order to protect the sharing of land property from generation to generation, the study recommend the system of family planning where every couple should get only one child. This study may be very useful for policy makers, planners and researchers in developing suitable programs addressing this ever growing issue, not only in the rural areas but also in the whole of Bangladesh and the developing nations as well.

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