STOCHASTIC MODELING OF SCHOOLING AND DROPOUTS OF STUDENTS OF THE MISING COMMUNITY OF ASSAM

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ABSTRACT

Stochastic models have been applied in different hierarchical systems. In this paper Stochastic model, the celebrated Markov Chain (Andrey Markov,1906) have been explored to estimate educational level and school continuation among students of Mising Community in the line with Gani (1963), Thonstad (1967) Odhiambo and Owino (1985). The study reveals a patterns of educational journey of Mising students.

Key Words: Markov Chain, Schooling, Dropout, Mising Community

1. INTRODUCTION

School enrolment and educational attainment of children age 6-14 in India and its states have been widely examined in both official and academic reports. However, there are absolutely no studies that highlight the differentials in the educational level and school continuation among Mising Community. As per 2001 census literacy rate (7 years and above) among Mising stands at 60.1 per cent. Male literacy stands at 71.4 percent and 48.3 percent female literacy at 48.3 percent only. The Mising Community in Assam whose population by 2001 Census is 587310 which is 2.2 per cent of total population of Assam However, there are absolutely no studies that highlight the differentials in the educational level and school continuation among Mising Community. It is expected that such a study can be used to identify key concerns in educational system experienced by Misings. Hence the study explores the educational level, school attendance and school continuation among children of Mising Community. In an education system students either transit from one grade to the next higher grade, repeat the same grade, successfully pass out from the system or drop out of the system before attaining the maximum qualification. Thus students enter permanent or absorbing states, either as pass outs or drop outs. Here attempt has been made to model using Markov Chain approach in which proportions of students who drop out of the system either successfully or unsuccessfully are separately grouped into double absorbing states

Stochastic models have been applied in different hierarchical systems. Thonstad (1967) used stochastic models to study enrolments in the Norwegian educational system in his book on educational planning. Uche (1980) applied the Markovian model to the Nigerian educational system. The Markovian Chain model has been used to study the Kenyan Primary education system see for example Owino (1982) and Odhiambo and Owino (1985). In these studies, several measures of academic survival for the Kenyan Primary education system were considered and compared. Odhiambo and Khogali (1986) studied the Kenyan Primary education system through a cohort analysis where they followed a group of students joining the system at a particular time until the cohort left the system. Owino and Phillips (1988) compared the retention properties of the Kenyan Primary education system between 1964 and 1972 and also between 1972 and 1980. It was found that the system was not time homogeneous in the two time periods. Owino and Odhiambo (1994) used a Markovian model to plan the Kenyan Primary education system by estimating several capital and human resource requirements for the system. In addition, Mbugua (2005) used the Markov Chain model to estimate the number of new entrants into the Kenyan primary education system following the introduction of free primary education. Also, a more recent study using the Markov Chain process was based on grade structured control in a manpower system (Owino and Bodo, 2005).

2. OBJECTIVES

The objectives of the chapter are as follows:

- Projection of cumulative dropout rates for Mising students who were in a particular grade within specific year before completing highest education.
- Projection of expected rates of completion of education by students of Mising community.
- Projection of long run dropout and completion rates.

3. DATA AND AREA OF STUDY

For the present analysis we mainly used the information collected through household schedule prepared keeping in mind the objectives of the study. All members of each sampled household were listed in the household schedule. Information on whether the person ever attended school , whether the person is still in school and highest education completed were collected for each person aged above six.. This information permits us to estimate level of education attained and school continuation rates (dropout rates) by years of schooling.

4. METHODOLOGY

Here we are going to analyse the data mainly by (a) Markov chain model and (b) transition rate model for qualitative variable.

4.1. STATES IN A SYSTEM

Let us consider a Markov Chain model with s non-absorbing states; 1, 2, 3...s corresponding to the grades of the system and r absorbing states corresponding to the various final qualifications. Here, r + s = N, thus N is the total number of possible states of the system. An absorbing state is a state which becomes permanent once it has been entered hence transition probabilities between absorbing states should be represented by one, justifying the use of the identity matrix. Transition from an absorbing state to a non-absorbing state which is impossible, should be represented by zero, hence the matrix of zeroes. Transitions from non-absorbing states to absorbing states are possible, likewise transitions between non-absorbing states.

4.2. TRANSITION PROBABILITY MATRIX

The transition probability matrix P of the Markov chain constructed herein is presented in the following canonical form, which is

$$P = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ r_{11} & r_{12} & q_{11} & q_{12} & q_{13} & q_{14} & q_{15} \\ r_{21} & r_{22} & q_{21} & q_{22} & q_{23} & q_{24} & q_{25} \\ r_{31} & r_{32} & q_{31} & q_{32} & q_{33} & q_{34} & q_{35} \\ r_{41} & r_{42} & q_{41} & q_{42} & q_{43} & q_{44} & q_{45} \\ r_{51} & r_{52} & q_{51} & q_{52} & q_{53} & q_{54} & q_{51} \end{bmatrix} \tag{1}$$

i.e., $$P = \begin{pmatrix} I & O \\ R & Q \end{pmatrix} \tag{2}$$

where;

I is a 2×2 identity matrix which gives transition probabilities between absorbing states

O is a 2×5 matrix of zeroes which gives transition probabilities from an absorbing state to a non-absorbing state

R is a 5×2 matrix, r_{ik} being the probability that a student in grade i at time (t-1) will complete with final education k at time t, i=1, 2,...,5 and k = 1, 2

Q is a 5 x 5 matrix, q_{ij} being the probability that a student who is in grade i at time (t-1) will be in grade j at time t; i, j = 1, 2,...,5.

In the double absorbing states model, k denotes absorbing states assuming states 1 and 2, where absorbing state 1 represents dropping out before attaining the maximum qualification and absorbing state 2 the completion of education after attaining the maximum qualification.

4.3. n-STEP TRANSITION PROBABILITY MATRIX AND LIMITING DISTRIBUTION

By the Chapman-Kolmogorov result, the n-step transition probability matrix for the process in canonical form is given by

$$P^{(n)} = P^n = \begin{pmatrix} I & O \\ (I+Q+Q^2+\dots\dots\dots+Q^{n-1})R & Q^n \end{pmatrix} \tag{3}$$

i.e.

$$P^n = \begin{pmatrix} I & O \\ R_n & Q^n \end{pmatrix} \tag{4}$$

where; I is an 2 x 2 identity matrix which gives transition probabilities between absorbing states in n steps

O is an 2 × 5 matrix of zeroes which gives transition probabilities from absorbing states to non-absorbing states in n steps.

$$R_n = r_{ik}^{(n)} = (I+Q+Q^2+\dots Q^{n-1})R \tag{5}$$

is a 5 × 2 matrix, which gives the probability that a student who is in grade i will complete with final education k within n years, i = 1, 2,...,5 and k = 1, 2,...,5. It is also called the completion rate.

$Q^n = (q_{ij})^n$ is an 5 × 5 matrix which gives the probability that a student who is in grade i will be in grade j, n years later ; i, j = 1, 2,...,5.

The limiting distribution of the process is given by

$$P^{(\infty)} = \lim_{n\to\infty} P^{(n)} = \begin{pmatrix} I & O \\ AR & O \end{pmatrix}$$

where, A = (I-Q) $^{-1}$ is known as fundamental matrix which is essence in analyzing absorbing Markov chain. The sum along the rows of the fundamental matrix give the expected number of number of steps before the process is absorbed, while $(I-Q)^{-1}R$ gives the probability of absorption to a particular state. Here $(I-Q)^{-1}$ exists as $\lim_{n\to\infty} Q^n = O$ or, equivalently spectral radius of Q is less than 1.

4.4. GRADE TO GRADE FLOW RATES

Here we considered five grades- grade I denotes primary school comprising of class I to class IV, grade II denotes middle school which comprises class V to class VII, grade III denotes high school which comprises class VIII to class X, grade IV denotes class XI and class XII, and grade V denotes any education degree, diploma, post graduation beyond higher secondary. The following set of data is acquired for calculating flow rates for different level:

- Grade-specific enrolment for Grades I, II, III, IV, and V (for t+1 only) for two consecutive years, t and t+1
- Grade-specific repeaters for Grades I, II, III, IV, and V in the latest year, say t+1.

The rates are computed by using the following formula:

$$\text{Promotion Rate} = \frac{\text{Number of Students Promoted to Grade 'g+1' in year 't+1'}}{\text{Number of Students Enrolled in Grade 'g' in year 't}}$$

In notations, it expressed by the following equation

$$(p_g^t) = \frac{p_{g+1}^{t+1}}{E_g^t}$$

$$\text{Repetition Rate} = \frac{\text{Number of Repeaters in grade g in year t+1}}{E_g^t}$$

$$(r_g^t) = \frac{R_{g+1}^{t+1}}{E_g^t}$$

$$\text{Dropout Rate} = \frac{\text{Number of students dropping out from grade g in year t}}{E_g^t}$$

$$(r_g^t) = \frac{D_g^t}{E_g^t}$$

4.5. INITIAL TRANSITION PROBABILITY MATRIX

Let the states of the system be denoted by integers 1, 2,..., N at times t = 0, 1, 2,... Let p_{ij} denote the probability that a student in grade i at time (t-1) will be in grade j at time t, giving rise to transition matrix $P = (p_{ij})$; i .j = 1, 2, ...,N. Let $n_{ij}(t)$ represent the number of students in grade i at time t-1 who will be in grade j at time t, also, let $n_i(t-1)$ represent the number of students in grade i at time (t-1), then assuming the multinomial distribution, the transition probabilities are estimated from

$$p_{ij} = n_{ij}(t)/n_i(t-1) \tag{6}$$

4.6. CUMULATIVE DROPOUT RATES

The dropout rate n years later from grade *i* is given by

$$r_{ik}^{(n)} = \sum_{j=i}^{s} q_{ij}^{(n-1)} r_{jk} \tag{7}$$

where i, j = 1, ..., s. It is to be noted that $q_{i\,j}^{(n-1)}$ is the probability that a student in grade i will be in grade j, (n-1) years later and r_{jk} is the probability that a student in grade j at time (t-1) completes with final education k at time t. Actually, $r_{ik}^{(n)}$ is the (i, k)th element of the product $Q^{(n-1)}R$.

Hence, the cumulative dropout rate within x years from grade i is given by

$$r_{ik}^{(x)} = \sum_{n=1}^{x} r_{ik}^{(n)} \tag{8}$$

where, i = 1, ...,s and k = 1,...,r.

Again, $r_{ik}^{(x)}$ is the (i, k)th element of $(I+Q+Q^2+...+Q^{x-1})R$, the basis of computations in this work.

4.7. LONG RUN DROPOUT AND COMPLETION RATES

If students remained in the system indefinitely, then the absorbing rate is given by

$$r_{i1}^{(\infty)} = \sum_{n=1}^{\infty} r_{i1}^{(n)} \tag{9}$$

$$= (I + Q + Q^2 + \ldots)R$$

$$= (I - Q)^{-1}R$$

5. RESULTS AND DISCUSSIONS

First, we present estimated values of drop-out(D), repeaters(R)and promotion(P) rate for students of Mising Community.

TABLE 1
DROP-OUT, REPEATERS AND PROMOTION RATE FOR STUDENTS OF MISING COMMUNITY

Grade	Male			Female			Both		
	D	R	P	D	R	P	D	R	P
I	0.1093	0.0332	0.8575	0.1380	0.0295	0.8325	0.1227	0.0315	0.8458
II	0.0250	0.0698	0.9051	0.0605	0.0403	0.8991	0.0420	0.0557	0.9023
III	0.0506	0.1205	0.8289	0.0809	0.0421	0.877	0.0635	0.0870	0.8945
IV	0.1116	0.1502	0.7382	0.1690	0.1021	0.7289	0.1431	0.1238	0.7331
V	0.4815	0.2104	0.3081	0.4900	0.1707	0.3392	0.4853	0.1923	0.6642

Initial Transition Process: The dropout proportions before attaining the maximum qualification for students who were in grades I, II, III,IV and V were (148/1354) = 0.1093, (19/759) = 0.0250, (21/415) = 0.0506 , (26/233) = 0.1116 and (286/594) = 0.4815 respectively. It is to be noted that the proportion of students who left the education system with some post higher secondary qualification is (1- 0.1093 - 0.0250 - 0.1116 - 0.4815) = 0.2220. This gives rise to the R component of the matrix P. In the Q component of the matrix P, position (1,1) represents the proportion of students who repeated grade I , position (1, 2) represents the proportion of students who proceeded to grade II from grade I . The same concept is applied to obtain the relevant proportions of students who were originally in grades II, III and IV for the remaining elements of the Q matrix.

We rewrite the above probabilities against seven states as follows

TABLE 2
STATES AND PROBABILITIES OF EDUCATION STATUS OF MISING BOYS

States→ ↓	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	1	0	0	0	0	0	0
2	0	1	0	0	0	0	0
3	0.1093	0	0.0332	0.8575	0	0	0
4	0.0250	0	0	0.0698	0.9052	0	0
5	0.0506	0	0	0	0.1205	0.8289	0
6	0.1116	0	0	0	0	0.1502	0.7382
7	0.4815	0.2220	0	0	0	0	0.2104

where state **1** is the permanent **dropout of children** from education system, state **2** represents students **Completing of Education** by taking any of post-higher secondary course, state **3** is **Primary School (Grade I**), state **4** is **Middle School (Grade II)**, state **5** is **High School (Grade III)**, state **6** is **Higher Secondary School (Grade IV),** and state **7** is **Post-higher Secondary course (Grade V).**

Assuming time homogeneity above **Table 2** is written in transition probability matrix (TPM) for Mising boys as

$$P_B = \begin{bmatrix} 1.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 \\ 0.0000 & 1.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 \\ 0.1093 & 0.0000 & 0.0332 & 0.8575 & 0.0000 & 0.0000 & 0.0000 \\ 0.0250 & 0.0000 & 0.0000 & 0.0698 & 0.9052 & 0.0000 & 0.0000 \\ 0.0506 & 0.0000 & 0.0000 & 0.0000 & 0.1205 & 0.8289 & 0.0000 \\ 0.1116 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.1502 & 0.7382 \\ 0.4815 & 0.2220 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.2104 \end{bmatrix}$$

Similarly on using relevant entries of above **Table 1** the transition probability matrix (TPM) for Mising girls is

$$P_G = \begin{bmatrix} 1.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 \\ 0.0000 & 1.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 \\ 0.1380 & 0.0000 & 0.0295 & 0.8325 & 0.0000 & 0.0000 & 0.0000 \\ 0.0605 & 0.0000 & 0.0000 & 0.0403 & 0.8991 & 0.0000 & 0.0000 \\ 0.0809 & 0.0000 & 0.0000 & 0.0000 & 0.0421 & 0.8770 & 0.0000 \\ 0.1690 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.1021 & 0.7289 \\ 0.4900 & 0.0616 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.1707 \end{bmatrix}$$

and TPM for boys and girls students combined is

$$P_C = \begin{bmatrix} 1.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 \\ 0.0000 & 1.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 \\ 0.1227 & 0.0000 & 0.0315 & 0.8458 & 0.0000 & 0.0000 & 0.0000 \\ 0.0420 & 0.0000 & 0.0000 & 0.0557 & 0.9023 & 0.0000 & 0.0000 \\ 0.0635 & 0.0000 & 0.0000 & 0.0000 & 0.0870 & 0.8494 & 0.0000 \\ 0.1431 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.1238 & 0.7331 \\ 0.4853 & 0.1433 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.1923 \end{bmatrix}$$

Performing the operations $(I+Q+Q^2+...+Q^{x-1})R$ we get R-components of TPM for Boys of Mising Community for times x = 0,1,2,3 which are presented in the following **Table 3**

TABLE 3

R-COMPONENTS OF TPM FOR BOYS OF MISING COMMUNITY

Times →	x = 0		x = 1		x = 2		x = 3	
R-components→	R_0		R_1		R_2		R_3	
Grade I	0.1093	0	0.1344	0	0.1760	0	0.2567	0
Grade II	0.0250	0	0.0725	0	0.1651	0	0.4616	0.1230
Grade III	0.0506	0	0.1492	0	0.4696	0.1358	0.6165	0.2012
Grade IV	0.1116	0	0.4838	0.1639	0.6145	0.2230	0.6499	0.2391
Grade V	0.4810	0.2220	0.5828	0.2687	0.6041	0.2785	0.6086	0.2806

In the following **Table 4** we write the first columns of R_i for $i = 1, 2, 3, \ldots, 10$ which are projected cumulative dropout rates for Mising boys who were in a particular grade within any year before completing highest education.

Table 4 reveals that by the year 2009, 13.44 per cent of the Mising boys who were in grade I had dropped out of the system and in the year 2016, 72.30 per cent of the boys who were in grade I are likely to drop out from the system before attaining the

TABLE 4

PROJECTED CUMULATIVE DROPOUT RATES FOR MISING BOYS WHO WERE IN A PARTICULAR GRADE WITHIN SPECIFIC YEAR BEFORE COMPLETING HIGHEST EDUCATION

Year / Grade	1	2	3	4	5	6	7	8	9	10
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
I	0.1344	0.1760	0.2567	0.5137	0.6540	0.7043	0.7191	0.7230	0.7240	0.7242
II	0.0725	0.1651	0.4616	0.6153	0.6686	0.6839	0.6879	0.6888	0.6891	0.6891
III	0.1492	0.4696	0.6165	0.6636	0.6764	0.6796	0.6803	0.6805	0.6805	0.6805
IV	0.4838	0.6145	0.6499	0.6585	0.6605	0.6609	0.6610	0.6610	0.6610	0.6610
V	0.5828	0.6041	0.6086	0.6096	0.6097	0.6098	0.6098	0.6098	0.6098	0.6098

maximum education. Similarly by 2016, 68.88 per cent , 68.05 per cent, 66.10 per cent and 60.90 per cent who were in grade II, III, IV and V respectively will drop out of the system without attaining the maximum education . In 2009 dropout percentages were 7.25, 14.92, 48.38 and 58.28 in grade II, III, IV and V respectively.

From similar computations, we prepare the projected cumulative dropout rates separately, presented in the **Table 5** and **Table 6** respectively, for Mising girls and girls-goys combined within a specific year who were in a particular grade before completing highest education.

TABLE 5

PROJECTED CUMULATIVE DROPOUT RATES FOR MISING GIRLS WHO WERE IN A PARTICULAR GRADE WITHIN SPECIFIC YEAR BEFORE COMPLETING HIGHEST EDUCATION

Year / Grade	1	2	3	4	5	6	7	8	9	10
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
I	0.1924	0.2566	0.3745	0.6332	0.7268	0.7497	0.7544	0.7553	0.7555	0.7555
II	0.1357	0.2750	0.5816	0.6849	0.7090	0.7139	0.7148	0.7150	0.7150	0.7150
III	0.2325	0.5673	0.6684	0.6906	0.6950	0.6957	0.6959	0.6959	0.6959	0.6959
IV	0.5434	0.6426	0.6631	0.6670	0.6677	0.6678	0.6679	0.6679	0.6679	0.6679
V	0.5736	0.5879	0.5904	0.5908	0.5908	0.5909	0.5909	0.5909	0.5909	0.5909

Table 5 reveals that by the year 2009, 19.24 per cent of the Mising girls who were in grade I had dropped out of the system and in the year 2016, 75.53 per cent of the boys who were in grade I are likely to dropout from the system before attaining the maximum education.

Similarly, by 2016, 71.50 per cent, 69.59 per cent, 66.79 per cent and 59.09 who were in grade II, III, IV and V respectively will drop out of the system without attaining the maximum qualification. In 2009 dropout percentages were 7.25, 14.92, 48.38 and 58.28 in grade II, III, IV and V respectively .

TABLE 6

PROJECTED CUMULATIVE DROPOUT RATES FOR MISING STUDENTS WHO WERE IN A PARTICULAR GRADE WITHIN SPECIFIC YEAR BEFORE COMPLETING HIGHEST EDUCATION

Year / Grade	1	2	3	4	5	6	7	8	9	10
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
I	0.1621	0.2138	0.3152	0.5745	0.6930	0.7290	0.7380	0.7401	0.7405	0.7406
II	0.1016	0.2196	0.5224	0.6529	0.6910	0.7004	0.7025	0.7029	0.7030	0.7030
III	0.1906	0.5189	0.6448	0.6790	0.6870	0.6887	0.6891	0.6892	0.6892	0.6892
IV	0.5166	0.6312	0.6586	0.6645	0.6657	0.6660	0.6660	0.6660	0.6660	0.6660
V	0.5786	0.5966	0.6000	0.6007	0.6008	0.6008	0.6008	0.6008	0.6008	0.6008

Table 6 reveals that by the year 2009, 16.21 per cent of the Mising students who were in grade I had dropped out of the system and in the year 2016, 74.01 per cent of the boys who were in grade I are likely to drop out from the system before attaining the maximum education. Similarly by 2016, 70.29 per cent, 68.92 per cent, 66.60 per cent and 60.08 who were in grade II, III, IV and V respectively will drop out of the system without attaining the maximum qualification. In 2009 dropout percentages were 10.16, 19.06, 51.66 and 57.86 in grade II, III, IV and V respectively.

Second columns of R_i for i = 1, 2,3 in the **Table 3** are the expected rates of completion of education by boys of the Mising Community. After estimating for few more years we present the these rates in the following **Table 7**

TABLE 7

ESTIMATED EXPECTED RATES OF COMPLETION OF EDUCATION BY BOYS OF MISING COMMUNITY

Year / Grade	1 2009	2 2010	3 2011	4 2012	5 2013	6 2014	7 2015	8 2016	9 2017	10 2018
I	0	0	0	0.1054	0.1670	0.1896	0.1963	0.1981	0.1985	0.1986
II	0	0	0.1230	0.1907	0.2147	0.2216	0.2234	0.2239	0.2240	0.2240
III	0	0.1358	0.2012	0.2224	0.2283	0.2297	0.2301	0.2302	0.2302	0.2302
IV	0.1639	0.2230	0.2391	0.2431	0.2440	0.2442	0.2442	0.2442	0.2442	0.2442
V	0.2687	0.2785	0.2806	0.2810	0.2811	0.2811	0.2812	0.2812	0.2812	0.2812

Table 7 reveals that maximum of 19.86 percent of boys of the community who were in grade I in 2008 are expected to complete any of the post higher secondary course. Likewise at most 22.40 per cent, 23.01 per cent, 24.42 per cent, 28.12 per cent of the boys who were in grade II, III, IV and V respectively in 2008 are expected to complete higher education.

Similarly we estimate expected rates of completion of education by girls of Mising Community and both boys and girls combined and are presented in **Table 8** and **Table 9** respectively.

TABLE 8

EXPECTED RATES OF COMPLETION OF EDUCATION BY GIRLS OF MISING COMMUNITY

Year / Grade	1 2009	2 2010	3 2011	4 2012	5 2013	6 2014	7 2015	8 2016	9 2017	10 2018
I	0	0	0	0.0295	0.0408	0.0436	0.0442	0.0443	0.0444	0.0444
II	0	0	0.0354	0.0480	0.0510	0.0516	0.0517	0.0517	0.0517	0.0517
III	0	0.0394	0.0518	0.0545	0.0551	0.0552	0.0552	0.0552	0.0552	0.0552
IV	0.0449	0.0571	0.0597	0.0602	0.0603	0.0603	0.0603	0.0603	0.0603	0.0603
V	0.0721	0.0739	0.0742	0.0743	0.0743	0.0743	0.0743	0.0743	0.0743	0.0743

Table 8 reveals that maximum of 4.44 per cent of girls of the community who were in grade I in 2008 are expected to complete any of the post higher secondary course. Likewise at most 5.17 per cent, 5.52 per cent, 6.03 per cent, 7.43 per cent of the girls who were in grade II, III, IV and V respectively in 2008 are expected to complete higher education.

TABLE 9

EXPECTED RATES OF COMPLETION OF EDUCATION BY STUDENTS OF MISING COMMUNITY

Year / Grade	1 2009	2 2010	3 2011	4 2012	5 2013	6 2014	7 2015	8 2016	9 2017	10 2018
I	0	0	0	0.0681	0.1015	0.1119	0.1145	0.1151	0.1152	0.1152
II	0	0	0.0805	0.1175	0.1285	0.1312	0.1318	0.1319	0.1320	0.1320
III	0	0.0892	0.1252	0.1351	0.1375	0.1380	0.1381	0.1381	0.1381	0.1381
IV	0.1051	0.1383	0.1463	0.1480	0.1484	0.1484	0.1484	0.1484	0.1484	0.1484
V	0.1709	0.1762	0.1772	0.1774	0.1774	0.1774	0.1774	0.1774	0.1774	0.1774

Table 9 reveals that maximum of 11.52 per cent of students of the community who were in grade I in 2008 are expected to complete any of the post higher secondary course. Likewise at most 13.20 per cent, 13.81 per cent, 14.84 per cent, 17.74 per cent of the students who were in grade II, III, IV and V respectively in 2008 are expected to complete higher education.

By computing $(I - Q)^{-1}R$ we obtain long run dropout and education completion rate by students of Mising Community which are presented in the Table 4.9 Considering boys who were in grades I, II, III IV and V in the long run, 72.43 per cent, 68.91 per cent, 68.05 per cent, 66.10 per cent and 60.98 per cent respectively dropped out of the system without attaining maximum qualifications. Considering the same boys in the same order, 19.87 per cent, 22.40 per cent, 23.02 per cent 24.42 per cent and 28.12 successfully completed education from the system. These are the very same entries in the absorbing rate under double absorbing states. Considering girls who were in grades I, II, III IV and V in the long run, 75.55 per cent, 71.50 per cent, 69.59 per cent, 66.79 per cent and 59.09 per cent respectively dropped out of the system without attaining maximum qualifications. Considering the same girls in the same order, 4.44 per cent, 5.17 per cent, 5.52 per cent, 6.03 per cent and 7.43 successfully completed education from the system. Considering both boys and girls who were in grades I, II, III IV and V in the long run, 74.06 per cent, 70.30 per cent, 68.92 per cent, 66.60 per cent and 60.08 per cent respectively dropped out of the system without attaining maximum qualifications.

TABLE 10

LONG RUN PROJECTION OF DROPOUT (D) AND COMPLETION (C) OF EDUCATION

Sex	Boys		Girls		Both	
Rates / Grade	D	C	D	C	D	C
I	0.7243	0.1987	0.7555	0.0444	0.7406	0.1152
II	0.6891	0.2240	0.7150	0.0517	0.7030	0.1320
III	0.6805	0.2302	0.6959	0.0552	0.6892	0.1381
IV	0.6610	0.2442	0.6679	0.0603	0.6660	0.1484
V	0.6098	0.2812	0.5909	0.0743	0.6008	0.1774

Considering the same students in the same order, 11.52 per cent, 13.20 per cent, 13.81 per cent 14.84 per cent and 17.74 successfully completed education from the system.

6. CONCLUSION

The Markov Chain technique accommodates the representation of absorbing rates, transition rates and dropout rates for both successful and unsuccessful students, from the education system. Out of Mising children who are now attending educational institution, almost 60 to 75 per cent in totality are likely to dropout from the system at any stage before completion of education. Among the boys 20 to 30 percent are likely to complete any of the post higher secondary course. But there is gender gap in dropout and completion of Grade V (***grade V denotes any education degree, diploma, post graduation beyond higher secondary***). The Mising girls are lagging way behind boys by as much as 15 per cent points.

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