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A study on nutritional status and factors influencing nutritional status of geriatric population in selected rural areas of Kamrup district, Assam

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Abstract
Background: Nutrition is an important factor contributing to health and functional ability. The effect of nutritional status on physical and psychological wellbeing is especially high in elderly. With the increasing longevity, nutrition status plays a significant role in the quality of life in the elderly. There was definite evidence that malnutrition was more common in geriatric population but it was underestimated in diagnostic and therapeutic procedures. Several studies had pointed out that physicians often overlook this problem and so fail to treat malnutrition in elderly patients [1].
Aim: The aim of the study to assess nutritional status and their influencing factors among geriatric population in selected rural areas.
Objectives
1. To assess the nutritional status of geriatric population.
2. To identify the factors influencing the nutritional status of the geriatric population.
Methodology: A community based cross sectional survey was conducted by using multi stage random sampling technique to select 350 number of elderly persons (60 years and above) from two Community Development Blocks of Kamrup district, Assam. The tool used for data collection was structured interview schedule that comprises of collection socio-demographic profile of the aged 60 years and above by using Pareek and Trivedi's socio-economic (Rural) scale and addition of 10 items and the Mini Nutritional Assessment (MNA), a survey including questions on lifestyle, diet, etc., of the respondents, to evaluate their nutritional status. The technique adopted for data collection was interview, measurement of height, weight, mid arm circumference and calf circumference. Data gathered was analysed by using descriptive and inferential statistics.
Results: The findings of the study revealed that out of the total study subjects female (61.28%) outnumbered males (48.63%). Among females majority were widows, illiterate and unemployed. Highest number of respondents (62.57%) were in socio-economic class-IV. A significant proportion of elderly (82.86%) were under nourished. Through logistic regression analysis, it was observed that socio-economic class, marital status, occupation, income and family type had a varying impact on the nutritional status.
Conclusion: This study clearly demonstrates an alarmingly higher prevalence of nutritional disorders in elderly people. So, there is an urgent need for improving the overall situation of the rural elderly people in the setting of detrimental socio-economic condition.

Keywords: Elderly, nutritional status, MNA, malnutrition, at risk of malnutrition, BPL, socio-economic status

1. Introduction
India is the country with the second highest population of the elderly, aged 60 and above, next only to China. The demographic transition, fall in fertility relates and enhanced life expectancy contributes to increased proportion of elderly persons in India. The 2011 census report has shown that the elderly population of Indian was 104 million while in 2001 census it was 77 million. In India, geriatric age group (age 60 years and above) constitutes 8.6% of the total population as per 2011 census. One important aspect of the aged population is that almost 80% of them live in rural areas which are usually remote and in accessible to health care services and plagued by socio-economic backwardness. Nutrition is an important factor contributing to health and functional ability. The effect of nutritional status on physical and psychological well being is especially high in elderly. With the increasing longevity, nutrition status plays a significant role in the quality of life in the elderly. Under nutrition is harmful leading to frailty, physical dependence and premature death apart from impairment of immune system, increased risk of infection and poor wound healing.

The energy requirement declines with age due to reduction in the body mass, body metabolism and physical activity [2]. The magnitude of malnutrition among the elderly in India is under reported. Lahiri, S. *et al.* in their studies shown that 29.4% elderly as malnourished and 60.4% as at risk of malnutrition [3].

The mini nutritional assessment (MNA) scale is to diagnose the risk of malnutrition in elderly individuals. This provides a simple and quick evaluation of the nutritional state of elderly people in the community. It is simple non-invasive, which facilitates its use in the community. It detects subjects at risk of malnutrition before significant changes occur in weights. Malnutrition in elderly patients is common because daily food consumption decreases with old age. Furthermore, the consumed food is low in calories, contributing to nutritional deficiencies and malnutrition [4].

With this background, the researcher intends to conduct a study on nutritional status and factors influencing nutritional status of geriatric population in a representative sample of a rural area of Kamrup district, Assam.

1.1 Problem Statement

A Study on Nutritional status and factors influencing nutritional status of geriatric population in selected rural areas of Kamrup district, Assam.

1.2 Objective

1. To assess the nutritional status of geriatric population.
2. To identify the factors influencing the nutritional status of the geriatric population.

1.3 Operational Definition

Elderly: Refers to persons male or female whose age is 60 years and above.

Geriatric population: Refers to the population whose age is 60 years and above.

Age: The age are considered from the voter list of 2020 and are matched with documents such as pension certificate, ration card etc.

Nutritional status: To assess nutritional status, Mini Nutritional Assessment (MNA) [5] tool was used. The MNA provides a simple and quick method of identifying patients who are at risk of malnutrition. It is both a screening and assessment tool for the identification of malnutrition in the elderly. This tool eliminates the need for more invasive tests such as blood sampling.

Literacy: The literacy status of the elderly population was recorded based on information given by them. Classification was made on the following:

- **Literate-** those who were able to read and write with understanding in any language. (2011 census)
- **Illiterate-** those who were not able to read and write.

Below Poverty Line (BPL) Families: In this study BPL families mean the families who are having the BPL card provided by the Govt.

Socio-economic status: Refers to the socio-economic status of the family determined by the scores on related items in modified form of Pareek's method of socio-economic classification[6] for rural areas.

1.4 Delimitation

The study is delimited to:

1) Selected rural areas of undivided Kamrup district.
2) Elderly people who were in the age of 60 years and above.
3) Elderly people who were present at home during the period of data collection.

2. Materials and Methods

2.1 Research Approach

The Research Approach adopted for the study was quantitative descriptive survey approach.

2.2 Research Design

The Research Design selected for the study was community based cross sectional descriptive survey design.

2.3 Study Setting

The present study has been undertaken in the undivided Kamrup district of Assam. The undivided Kamrup district consists of two newly developed districts namely Kamrup and Kamrup (Metropolitan) district. There are 17 development blocks under undivided Kamrup district. Out of the 17 development blocks, Dimoria and Kamalpur development blocks were selected randomly for the study. Out of the 183 villages of Dimoria block, 18 villages were selected randomly for the study and the names of these villages are Maloibari, Pub Maloibari, Rewa, Teteliguri, Tetelia, Mitani, Chamata Pathar, Kamarkuchi, Nazirakhat, Tepesia, Baruabari, Hahara, Kamalajari, Borkhat, Sonapur Pathar, Gumoria, Amarapathar and Hatkhola. Kamalpur Development block has 12 Gaon Panchayat comprising of 66 villages. Out of 66 villages, 7 villages were selected randomly for the study and the name of these villages are Borka, Dorakohora, Baruajani, Bamun gaon, Piolikhata, Khorikat and Jalimura.

2.4 Study Population

The study population comprise of all elderly people of 60 years and above covering 18 selected villages of Dimoria Development Block and 7 selected villages of Kamalpur Community Development block.

2.5 Sample

Sample consisted of elderly population 60 years and above from 18 selected villages of Dimoria Community Development Block and 7 selected villages of Kamalpur Community Development Block.

2.6 Sample Size

The total population of 60+ for the Dimoria and Kamalpur Development Block were estimated at 2307 and 1055. It was decided that 10 per cent of this estimated geriatric population would be representative of the population and was therefore taken up for this study which gave the sample size of 240 for Dimoria and 110 for Kamalpur Development block. Thus, the total sample size came to (240 +110) = 350.

2.7 Sampling technique

A multistage random sampling technique was used in the present study.

2.8 Criteria for Sample selection

Inclusion Criteria

1. Elderly persons who were in the age group of 60 years and above.
2. Elderly persons who reside in the selected villages.
3. Elderly people who were willing to participate in the study.
4. One elderly persons from each selected household.

Exclusion Criteria

1. Elderly people whose names were not included in the voter list.
2. Elderly people who were bedridden and could not stand properly.
3. Elderly people who were semi-conscious or unconscious.

2.9 Description of the Tool

Data collection instrument was structured interview schedule which has two sections. Section- I consists of socio-demographic profile of the aged 60 years and above by using Pareek and Trivedi's socio-economic (Rural) scale and addition of 10 items.

Section-II consists of the assessment of Nutritional status by using Mini Nutritional Assessment (MNA) scale which was done by using 18 items (30 points), which are based on the following components: anthropometric measurement, dietary questionnaire, global health and nutrition. Subjects were weighed with a floor scale to the nearest 0.1 kg and height, mid arm circumference and calf circumference were measured to the nearest 0.1 cm. Malnutrition indicator scores of <17 were considered malnourished, between 17 and 23.5 were considered at risk of malnutrition, between 24 and 30 were considered normal.

2.10 Variables of the study

Socio-demographic variables: These were:- age, sex, religion, caste, marital status, type and size of family, education, occupation, source of income, per capita income per month, presence of BPL card, financial dependency, type of house, social participation, Land, farm power & material possession.

Research variables: The research variables in this study were nutritional status of the elderly and factors influencing their nutritional status.

3. Results

Section-I: Socio-demographic characteristics of sample

- Majority of the respondents is of the age group 60-69, both in case of males and females. In case of females however percentage is much higher (61.28%) than males (48.63%) in this age group.
- More than 95 percent of the respondents were Hindu. The caste representation of respondents were 12.86 percent SC, 17.14 percent ST, 29.43 percent OBC and 39.71 percent General caste.
- 94.57 percent of the respondents are married and only 5.14 percent are unmarried and 34.57 percent of respondents are widow.
- Respondents are distributed between joint and nuclear families almost in equal proportion. Nuclear family is prominent among the males (53.42%) in almost equal proportion as that of the joint families to (53.92%) females.
- 42.29 percent respondents families are having more than five members.
- Majority of the respondents is literate and a considerable proportion of them are also illiterate (38.86%). Among the females majority is illiterate (58.83%).
- 15.71 percent of the respondent are still working and their numbers are more among males constituting 22.60 percent.
- Regarding past occupation of the respondents, 46 percent of the female respondents were housewife and the strength of the total unemployed was 16.29 percent; of the remaining respondents 16.86 percent were cultivators and 10.85 percent were service holders. Among the female respondents as much as 90.69 percent were unemployed.
- Regarding sources of income 37.14 percent respondents are dependent on children followed by 21.43 percent on pension.
- The majority of the respondents' (32.00%) per capita income is between Rs. 500 & Rs1499/. Only 10.57 percent of the respondents' per capita income exceeds Rs 10,000.
- Around one third (32.57%) of the respondents belong to below poverty line category and they hold BPL cards, while 61.71 percent are of non BPL category respondents.
- Only 20.28 percent respondents were financially independent. Majority (75.58%) was dependent either fully (52.29%) or partially (26.29%). Among the women respondents proportion of dependent was more i.e. 66.67 percent of them were fully dependent and 21.08 percent were partially dependent.
- Majority (56.57%) of the respondents is having *kutcha* houses followed by brick houses in respect of 22.86 percent.
- Regarding social participation 49.42 percent respondents are associated with at least one organization and more, while 45 percent respondents are having no such association.
- Majority (61.43%) of the respondents has land less than 1 acres followed by respondents having 1 acre of land (25.43%). Among the respondents 11.14 percent were landless.
- Regarding farm power, majority (55.71%) of the respondents do not possess any animals. 29.14 percent possess either one or two animals. Only 2.86 percent possess five to six animals.
- 78.57 percent of the respondents do not have any farm, only 20.86 percent respondents have some type of farms and majority has poultry farms. 13.24 percent women are having poultry farms where 8.91 percent males have such farms.
- In respect of socio economic classes, no respondent was found in the socio-economic class I. Highest number of respondents (62.57%) are in socio-economic class IV. Among the males a considerable proportions are in socio-economic class II (37.67%) occupying second position while in case of females, the next higher category is the socio-economic class V (28.43%).

Section-II: Nutritional status of geriatric population

The data gathered during the survey is presented in the table below.

Table 2.1: Age and Sex wise distribution of Nutritional Status of the respondents N=350

	Male				Female				Total			
	60-69	**70-79**	**80+**	**total**	**60-69**	**70-79**	**80+**	**total**	**60-69**	**70-79**	**80+**	**Grand total**
Normal/Well nourished	14 09.59	09 06.16	04 02.74	27 18.49	25 12.25	07 03.43	01 00.49	33 16.18	39 11.14	16 04.57	05 01.43	60 17.14
At risk of malnutrition	43 29.45	37 25.35	12 08.22	92 63.02	74 35.27	38 18.63	04 01.96	116 56.86	117 33.43	75 21.43	16 04.57	208 59.43
Malnourished	14 09.59	09 06.16	04 02.74	27 18.49	26 12.75	25 12.25	04 01.96	55 26.96	40 11.43	34 09.71	08 02.29	82 23.43
Total	71 48.63	55 37.68	20 13.70	146 100	125 61.27	70 34.31	09 04.41	204 100	196 56.00	125 35.71	29 08.29	350 100

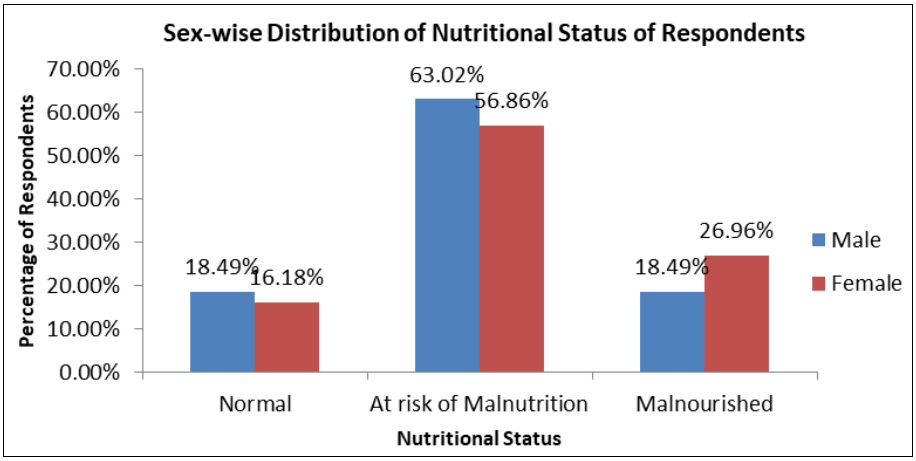

Fig 1: Sex-wise Distribution of Nutritional Status of Respondents

It may be observed from the table -2.1 that as much as 59.43 per cent of the respondents are at risk of malnutrition while 23.43 per cent are already malnourished. Male respondents are prominently are at risk of malnutrition than females. As against 63.02 per cent of males in this category, percentage of females is 56.86. However, as against 18.49 per cent malnourished male respondents, there were 26.96 per cent female malnourished respondents.

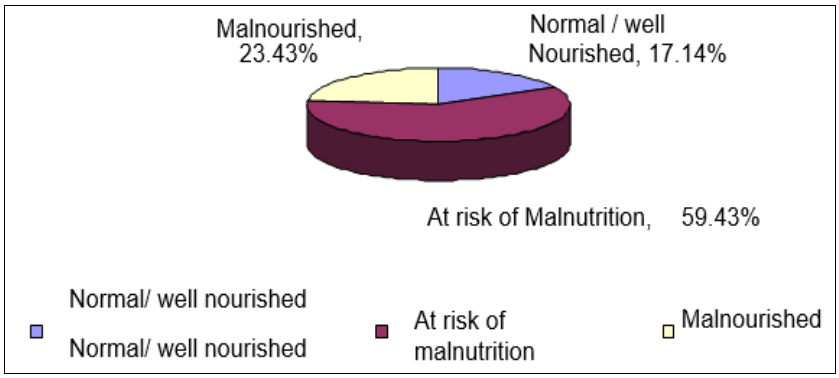

Diagram 2.1

In table 2.2 – mean and standard deviation of nutritional scale is presented. The mean shows that the distribution is already centralized around that level 2 i.e. "at risk of malnutrition and further tilted towards the level -3 i.e. malnourishment.

Table 2.2: Nutritional status Mean and SD

Nutritional Status	**N**	**Mean**		**Std. Deviation**	**Variance**
	Statistic	**Statistic**	**Std. Error**		
	350	2.06	0.034	0.633	0.400

Table 2.3: Nutritional Status Mean, SD and Tukey-Kramer Test

Type of Nutritional status	**Mean**	**SD**	**SE**	**"q"**	**p value**
Normal/Well nourished (A)	17.335	1.633	1.155	(A)v(B)=13.761	(A)v(B)= S, p<0.01
At risk of malnourished (B)	59.94	4.356	3.080	(A)v(C)=1.741	(A)V(C)=NS p>0.05
Malnourished (C)	22.73	5.989	4.235	(B)v(C)=12.020	(B)v(C) = S, p<0.01

In Table-2.3 presented the results of multiple comparison tests. P value in ANOVA test comes to 0.0042 which may be considered very significant. The variation among column means is significantly greater than expected by chance. Multiple comparison tests were conducted with the hypothesis that "various nutritional statuses do not differ significantly". The test shows that if the value of "q" is greater than 5.910, then the "p" value is less than 0.05.

The Table 2.3 shows that mean percentage is highest in respect of "at risk of malnourishment category followed by malnourished. "q" value is significant between "normal" and "at risk of malnourishment"; "at risk of malnourishment" and "malnourished" implying thereby that there is significant differences between these two levels. In the remaining case, i.e between "normal" and "malnourished" the mean values do not differ significantly.

Section III: Determine the factors influencing nutritional status of the geriatric population

Table 3.1: Nutritional status and socio-demographic variables

Gender	Normal		At risk		Malnourished	
	NOS	%	NOS	%	NOS	%
Male (n=146)	27	18.49	92	63.02	27	18.49
Female (n=204)	33	16.18	116	56.86	55	26.96
Age group						
60-69 (n=196)	39	19.90	117	59.69	40	20.41
70-79(n=125)	16	12.80	75	60.00	34	27.20
80+ (n=29)	05	17.24	16	55.17	08	27.59
Marital status						
Married	40	22.60	104	56.76	33	18.64
Unmarried	0	00.00	13	72.22	5	27.78
Widow	18	14.88	66	54.55	37	30.58
Widower	4	11.76	23	67.65	7	20.59
Family type						
Single	29	16.86	119	69.19	24	13.95
Joint	31	17.42	128	71.91	19	10.67
Literacy level						
Illiterate	17	12.50	82	60.29	37	27.21
Can read only	0		0		2	100
Can read & write	4	08.89	32	71.11	9	20.00
Primary school	18	19.78	51	56.04	22	24.18
Middle school	15	41.67	16	44.44	5	13.89
High school	5	17.86	17	60.71	6	21.43
Graduate	1	08.33	8	66.67	3	25.00
Occupational status						
Having occupation	7	12.73	32	58.18	16	29.09
No occupation	51	17.29	178	61.33	66	22.57
Sources of income						
Nil	4	16.67	16	66.67	4	16.67
Pension	15	20.00	41	54.67	19	25.33
Savings	0	00.00	3	75.00	01	25.00
Rent	1	04.55	16	72.73	05	22.73
Allowances	0	00.00	3	100.0	0	00.00
Dependent on children	26	20.00	76	58.46	28	21.54
Any other	10	10.87	35	38.04	16	17.39
Dependency status						
Dependent	31	16.94	115	52.84	37	20.22
Partially dependent	6	06.52	58	63.04	28	30.43
Independent	22	30.99	33	46.48	16	22.53
Socio-economic class						
Class i	0	0	0	0	0	0
Class ii			4	100	00	0
Class iii	17	26.15	33	50.77	15	23.08
Class iv	36	16.44	134	51.19	49	22.37
Class v	7	11.30	37	59.68	18	29.03

The above table reveals that in case of age groups, the trend shows that more the age, the greater is the chance of being malnourished. Going by the marital status we may see that widowed women have tendency of being malnourished. However, very few among the married respondents are malnourished. In a nuclear family, there is greater chance for the persons being malnourished. There is scope to believe that since in a joint family there is always someone to look after a member at risk, therefore the chance of being malnourished is less. Literacy level does not show any trend in this case. In case of income as a variable, it may be seen that those who earns a regular income (say pension) tops the both extremes i.e highest malnourished and highest normal. But on the whole sources of income as a factor of malnourishment show a mix trends. Those who are dependent they are lesser malnourished than those who are

partially dependent or independent. The worst dependent class is the partially dependent class. Thus dependency has a direct relationship with the malnourishment. Similar is the case with socio-economic class. The more we go down the socio-economic category, the more we find the cases of malnourishment.

3.2: Logistic Regression Analysis for Nutritional Status and Socio-demographic variables

Table 3.2: Logistic Regression Analysis of Nutritional Status

	B	S.E.	Wald	df	Sig.	Exp (B)	95.0% C.I. for EXP (B)	
							Lower	Upper
Age	.184	.230	.635	1	.425	1.202	.765	1.888
Gender	-.523	.362	2.085	1	.149	.593	.291	1.206
Marital	.236	.142	2.743	1	.098	1.266	.958	1.674
Family type	-.011	.257	.002	1	.966	.989	.597	1.637
Occupation	.126	.218	.332	1	.565	1.134	.739	1.740
Dependency	-.331	.182	3.307	1	.069	.718	.503	1.026
Income	.048	.110	.189	1	.664	1.049	.846	1.301
Housing	-.030	.051	.361	1	.548	.970	.879	1.071
Socio econ class	.315	.256	1.510	1	.219	1.370	.829	2.263
Constant	.533	1.536	.121	1	.728	1.704		

In the Table-3.2 presented the outcome of the logistic regression analysis. It may be observed that the association of nutritional status (normal or malnourished) of the respondents with that of the predictive variables e.g., age, sex, marital status, residence, education, job status, source of monetary support, etc, with varying degrees of effects. Gender (OR=0.593, 95%, CI =0.2-1.2 and dependency (OR=0.718, 95%, CI =0.5-1.0) has a weak effect on the nutritional status. On the other hand socio-economic class is 1.3 times more likely to have effect on nutritional status (OR=1.370, 95%, CI =0.95-2. There is possibility that respondents with higher social status would tend to remain normal. Factors like marital status are a contributory factor to the nutritional status of the respondents. Those who are married more likely to have one time more chance to be in good nutritional health than the others (OR=1.26, 95%, CI =0.95%, 0.95 - 1.6.). Occupation, income and family type also in the same way have varying impact on the nutritional health.

4. Discussion

In the present study as much as 59.43 percent of the respondents are at risk of malnutrition while 23.43 percent are already malnourished. Male respondents (63.02%) are prominently at risk of malnutrition than females (56.86%). However, as against 18.49 percent well-nourished male respondents there were 26.96 percent female malnourished respondents. The findings of higher percentage of elderly population at risk of malnutrition corroborate with the findings of Baweja, *et al.*'s (2008) [7] study performed in western Rajasthan involving 1000 community dwelling elderly subjects and revealed that 7.1% elderly were malnourished while 50.3% were at risk of malnutrition and only 42.6% were well nourished. Similar findings were reported by Vedantam, *et al.* (2010) [8], Marias *et al.* (2007) [9] and Ferdous *et al.* (2009) [10] and Kavya C *et al.* (2016) [11]. This highlights that elderly population is vulnerable for malnutrition.

In the present study nutritional status and other socio-demographic variables were observed and found that more the age the greater is the chance of being malnourished. Widowed women have tendency of being malnourished. In a nuclear family, there is greater chance for the persons being malnourished where in a joint family, the chance of being malnourished is less. While sources of income as a factor of malnourishment show a mix trends. Those who are dependent, they are lesser malnourished than those who are partially dependent or independent. The worst dependent class is the partially dependent class. Thus dependency has a direct relationship with the malnourishment. In case of socio-economic class, more we go down the socio-economic category, the more we find the cases of malnourishment.

Logistic regression analysis on nutritional status of the respondents with other predictive variables e.g. age, sex, marital status, residence, education, occupation, source of income, etc., it was observed that gender and dependency has a weak effect on the nutritional status. On the other hand socio-economic status is 1.3 times more likely to have effect on nutritional status. Factors like marital status are a contributory factor to the nutritional status of the respondents. Those who are married more likely to have one time more chance to be in good nutritional health than the others. Occupation, income and family type also in the same way have varying impact on the nutritional status.

Similar findings were reported by Tamanna (2007) [12] wherein it was found that women had significantly lower MNA scores than men ($P< 0.01$). Literates had higher MNA scores compared to the illiterate elderly ($P<0.01$). More than half (64%) of the participants had no personal income and persons who had an income also had better nutritional status ($P<0.05$). The elderly people who received regular financial support had higher MNA scores ($P<0.05$).

Timpeni *et al.* (2011) [13] in their study reported that low education, poor financial condition, and lack of physical and leisure activities showed a crude association with risk for malnutrition. Multi adjusted logistic regression model shows that only low education (OR=2.9; 95% CI=1.2-6.8) and lack of physical activity (OR=4.4; 95%, CI=2.0-9.7) were independently associated with the risk for malnutrition. Masud Rana (2005) [14] reported that gender variations was minimum, poverty, education and marital status were significantly correlated with the nutritional status ($P<0.05$). Multivariate analysis confirms that poverty, literacy and marital status were important covariates of nutritional status of elderly people which are consistent with the findings of the present study.

5. Conclusion

The study was successful in unveiling important and significant facts regarding the socio-demographic characteristics and nutritional status of geriatric population of the mentioned study area. As far as nutritional status is concerned a significant proportion of elderly were at risk of malnutrition. Through logistic regression analysis, it was observed that socio-economic class, marital status, occupation, income and family type had a varying impact on the nutritional status. So, there is an urgent need for improving the overall situation of the rural elderly people in the setting of detrimental socio-economic condition.

6. Recommendation

1. This study was confined to rural villages in Kamrup district of Assam. Thus the results of the study are applicable to similar kind of situation analysis, if a researcher do it in urban areas and in macro level the result would be different.
2. Considering the high prevalence of poor nutritional status among rural elderly, more focus on diet and possible nutritional intervention are required. In view of this, supplementary nutrition programmes targeting needy elderly in the rural area may be considered on a priority basis, which could significantly enhance the possibility of maintaining good nutritional status of the elderly.

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