International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182, Print ISSN: 2349-5979
Impact Factor: RJIF 5.72
Received: 06-05-2018; Accepted: 13-06-2018
www.allsubjectjournal.com
Volume 5 Issue 6; June 2018; Page No. 120-126

Health conditions and socio-economic status of elderly in rural Tamil Nadu

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Abstract
The present study based on a representative sample of 900 elderly aged 60 years and above selected from three different districts of rural Tamil Nadu revealed that the disease prevalence is more among female than male and age related diseases like vision, frailty, Alzheimer are more among elderly aged 80 years and above while the life threatening diseases like blood pressure, diabetes, lung problems and heart ailments are more prevalent among young old. Young old are more prone to diabetes compared to old old (80+). Female are more prone to heart ailments, high blood pressure, arthritis and diabetes. Education played a significant role in increasing the chances of blood pressure and diabetes. The results suggest community based geriatric services through primary health care system for an improved health and dignified life of elderly in rural areas.

Keywords: elderly, disease, prevalence, geriatric

Introduction
Declining mortality and fertility rates lead to population aging as a universal phenomenon in todays' world. Prevention of infectious diseases and improved sanitation, hygiene and standard of living of people resulted in the decline of mortality in all countries of the world. The average life expectancy at birth in low-income countries has increased from around 48 years in the early 1955 to 65 years in1990 and is expected to reach 73 years in 2025. (WHO, 1998) [14]. Population aged 65 years or older is projected to grow from an estimated 524 million in 2010 to nearly 1.5 billion in 2050, with most of the increase in developing countries. The incredible increase in life expectancy in the past were due to changes in the leading causes of disease and death from infectious and parasitic diseases to non-communicable diseases that more commonly affect adults and older people impose the greatest burden on global health (WHO, 2011) [15]. Cancer and heart disease are more related to people aged 70-75 years than others. People aged over 75 years become more prone to impairments of hearing, vision, mobility and mental function. Over 80 per cent of circulatory disease deaths occur in people aged 65 years and above. Worldwide, circulatory disease is the leading cause of death and disability in people aged 65 years and above. The risk of developing dementia rises steeply with age in people aged morethan60 years. Women are more likely to suffer than men because of their greater longevity (WHO, 1998) [14].

The remarkable decrease in the death rates and significant improvement in life expectancy in India have resulted in the steady increase in the number of elderly in the country. The number of elderly aged 60 years and above has reached 104 million in the year 2011 as per the 2011 census that represent about 8.6 per cent of the total population. It is also observed that 71 percent of elderly population aged 60 years and above in India resides in rural areas while 29 percent is in urban areas (Census of India, 2011) [2]. Among the elderly resides in rural India, nearly half are of poor socioeconomic status (Lena et al., 2009) [6]. About half of the Indian elderly are dependents, often due to widowhood, divorce, or separation, and 70 percent of them are women (Rajan, 2001) [9]. Just 2.4 per cent of the elderly living alone and among them more are women (3.49 per cent) than men (1.42per cent) (Rajan and Kumar, 2003) [8].

The National sample survey organization (2006) [7] reported that elderly experience more burden of illness than others both among male and female and in both rural and urban areas. The diseases that most frequently afflicting the elderly are cardiovascular diseases, circulatory diseases, and cancers (Kouske and Samir, 2004; Shrestha, 2000) [4]. Cardiovascular disease is the major cause of death among the elderly (Jha et. Al., 2006) [3]. The other chronic diseases that most severely afflicted the elderly are: chronic bronchitis, anemia, high blood pressure, chest pain, kidney problems, digestive disorders, vision problems, diabetes, rheumatism, and depression (Angra et al., 1997; Kumai, 2001; Raju, 2000; Roy, 1994; Shah and Prabhakar, 1997) [1, 5, 9, 10, 11]. Studies have shown that most of the elderly in rural areas are affected by one or other chronic diseases that make their life highly miserable due to poverty, inadequate familial support and in-accessible public health care system. In this context, the present study examines the health status and its correlates among elderly in rural Tamil Nadu.

Objectives
- To assess the health problems and overall health status of community living elderly in rural areas:
- To assess the influence of various socio demographic factors influencing the health status of elderly; and

- To suggest suitable measures for a better health and happy living of elderly in rural areas.

Data and Methods

The data for the present study has been taken from a large scale study conducted by the author with funding from the Indian Council of Medical Research, New Delhi on a representative sample of 900 elderly persons selected from the rural areas of three different districts of Tamil Nadu viz., Madurai, Karur and Villupuram representing high, medium and low level of development districts respectively as per the Tamil Nadu Human Development Index (2003) [8]. The sample was selected based on multistage random sampling procedure. In the first stage, after the selection of districts, three Primary Health Centers (PHCs) were selected from each of the selected districts based on their distance from the district Head Quarters. In the next stage, one sub-center (SC) was selected at random from each of the selected PHCs and all the households with elderly persons aged 60 years or more in the selected SCs were listed. From the list, 100 elderly persons were selected using systematic random sampling procedure from each of the SC area. Thus a total of 300 households with elderly person aged 60 years and above were selected from each of the selected districts. Overall, a total of 900 elderly were selected from the rural areas of the three selected districts of Tamil Nadu. The data were collected using a pretested structured interview schedule through personal interview by contacting each of the elderly at their home. The data on the health conditions of the elderly were collected based on their self-reported signs and symptoms. The data were collected during the period from March 2008 to September 2008. The data analysis was carried out using Statistical Package for Social Sciences (SPSS).

Results and Discussion

Background Characteristics

Among the 900 elderly interviewed in this study, 46 per cent were male and 54 per cent were female. It is observed that 17.7 per cent were aged 60-69 years, 61.4 per cent were aged 70-79 years and 20.8 per cent were aged 80 years and above. The proportion of elderly aged 80 years and above is substantially higher among male (23.9 per cent) than female (18.1 per cent). The mean age of elderly interviewed is 74.2 years. The mean age of elderly is slightly higher for male (74.73 years) than female (73.75 years).

Overall, 57.2 per cent of elderly were illiterates. Substantially higher proportion of female elderly were illiterates (78 per cent) compared to male (32.9 per cent). Majority of the elderly (88.4 per cent) were Hindus. Muslim and Christian constituted only 6.4 per cent and 5.1 per cent of the total sample respectively.

Nearly two thirds of elderly (65.6 per cent) were belonging to Backward Caste. SC/ST and Most Backward Caste (MBC) constituted only 22.6 per cent and 11.9 per cent respectively. It is observed that 80.9 per cent of male and just 13 per cent of female were married. Substantially higher proportion of female elderly were single (87 per cent) compared to male (19.1 per cent). Comparatively higher proportion of female (80.9 percent) were belonging to joint family where as it is only 45.9 percent among

Table 1: Percent distribution of elderly by sex and selected background characteristics

Background characteristics	Male N=414	Female N=486	Total N=900
Age (Years)			
60 – 69	17.9	17.7	17.7
70 – 79	58.2	64.2	61.4
80+	23.9	18.1	20.8
Mean (years)	74.73	73.75	74.20
Education			
Illiterate	32.9	78.0	57.2
Literate	67.1	22.0	42.8
Religion			
Hindu	88.6	88.3	88.4
Muslim	6.5	6.4	6.4
Christian	4.8	5.3	5.1
Caste			
SC/ST	21.3	23.7	22.6
MBC	15.0	9.3	11.9
BC and others	63.8	67.1	65.6
Marital status			
Married	80.9	13.0	44.2
Single	19.1	87.0	55.8
Type of Family			
Nuclear	54.1	19.3	35.3
Joint	45.9	80.7	64.7
Type of house			
Hut	21.3	14.8	17.8
Katcha	44.0	53.3	49.0
Pucca	34.8	31.9	33.2
Toilet facilities			
Yes	36.2	33.7	34.9
No	63.8	66.3	65.1

The socio-economic status of the family was assessed based on the possession of certain household items.

Male. Nearly one third of elderly (33.2 percent) were living in pucca house while 49 per cent were living in katcha house and 17.8 per cent in hut. It is also observed that only 34.9 per cent of elderly were having toilet facilities in their house (Table 1).

Gender and health problems of elderly

The self-reported health problems of elderly are classified in to 17 categories. In order to assess the sex difference in the health problems of elderly, the results of the analysis of data on the health problems of elderly by sex are presented in Table 2. The major health problems as reported by the elderly are poor vision/cataract/other eye impairment (66.4 per cent), Arthritis/rheumatic joint pain (62.6 per cent), and back

Table 2: Percent distribution of elderly by health problems and sex

S. No	Health Problems	Male	Female	Total	χ^2	DF	P-value
		N-414	N – 486	N – 900			
1.	Poor vision / cataract / other eye impairment	59.7	72.2	66.4	15.819	1	0.000
2.	Lung problems / respiratory problems/ asthma.	15.5	14.2	14.8	0.282	1	0.595
3.	Tuberculosis/other chronic fever	3.1	.8	1.9	@		
4.	Diarrhea/gastro enteritis/ stomach ulcer	12.1	18.7	15.7	7.476	1	0.006
5.	Skin disease	7.0	6.2	6.6	0.253	1	0.615
6.	Angina/ chest pain/cardiac problem	13.8	15.6	14.8	0.621	1	0.431
7.	High blood pressure	23.7	30.2	27.2	4.879	1	0.027
8.	Arthritis/rheumatic joint pain	57.0	67.3	62.6	10.084	1	0.001
9.	Back pain / slipped disc	29.0	44.4	37.3	22.836	1	0.000
10.	Neurological or mental problems	7.5	9.3	8.4	0.907	1	0.341
11.	Dementia/memory loss	2.9	3.3	3.1	0.115	1	0.735
12.	Frailty/general weakness/run down condition	19.3	20.0	19.7	0.057	1	0.811
13.	Injury and related disabilities	4.3	5.1	4.8	0.312	1	0.577
14.	Diabetes	12.1	11.9	12.0	0.004	1	0.947
15	Dental problems	3.6	3.1	3.3	0.200	1	0.655
16.	Kidney problem	7.2	3.7	5.3	5.557	1	0.018
17.	Alzheimer	15.2	17.7	16.6	0.994	1	0.319

@ χ^2 not calculated as some of the cell frequencies are less than 5.

Pain/slipped disc (37.3 per cent), high blood pressure (27.2 per cent), frailty/general weakness/run down condition (19.7 per cent), Alzheimer (16.6 per cent), Diarrhea/gastro enteritis/stomach ulcer (15.7 per cent), Angina/chest pain/cardiac problem and lung problems/ respiratory problems / asthma (14.8 per cent each).

The results showed that nearly two third of elderly are reported to have afflicted with eye problems. Ortho problems are reported as the next major illness as reported by 62.6 percent. Back pain is also reported to have affected more than one third of elderly while more than one fourth reported to have affected by high blood pressure.

Though gender differences are observed in the proportion of elderly suffering from different health problems, the differences are significant only in the cases of poor vision/cataract/other eye impairment; diarrhea/gastro enteritis stomach ulcer; high blood pressure; arthritis/ rheumatic joint pain, back pain/slipped disc; and osteoporosis and bone fractures, which are significantly more among female than male. At the same time, kidney problem is observed to be significantly more among male than female.

Age and health problems of elderly

Age is an important factor in aggravating diseases among elderly. The health problems of elderly according to their age presented in Table3. indicate that among the major health problems reported by the elderly, vision problems, frailty and Alzheimer are observed to be more prevalent among old old (80+) than the young old while the cardiac problems, high blood pressure and diabetes are observed to be more prevalent among young old indicating the steady rise of these diseases in the recent times.

Table 3: Percent distribution of elderly by health problems and age

Health Problems	Age (years)					χ^2	DF	P- value
	60-69 N=160	70-79 N=553	80+ N=187	Total N=900				
1. Poor vision/cataract/other eye impairment	61.9	66.2	71.1	66.4		3.351	2	0.187
2. Lung problems/respiratory problems/asthma	18.8	14.1	13.4	14.8		2.498	2	0.287
3. Tuberculosis/other chronic fever	2.5	1.4	2.7	1.9		1.528	2	0.466
4. Diarrhea/gastro enteritis/stomach ulcer	16.9	16.6	11.8	15.7		2.725	2	0.256
5. Skin disease	5.0	6.3	8.6	6.6		1.900	2	0.387
6. Angina/ chest pain/cardiac problem	16.3	14.8	13.4	14.8		0.571	2	0.752
7. High blood pressure	25.6	28.2	25.7	27.2		0.706	2	0.703
8. Arthritis/rheumatic joint pain	67.5	61.8	60.4	62.6		2.151	2	0.341
9. Back pain/slipped disc	35.0	38.5	35.8	37.3		0.885	2	0.642
10. Neurological or mental problems	7.5	8.9	8.0	8.4		0.352	2	0.839
11. Dementia/memory loss	1.9	3.1	4.3	3.1		1.658	2	0.436
12. Frailty/general weakness/run down condition	13.8	19.9	24.1	19.7		5.852	2	0.054
13. Injury and related disabilities	6.3	3.8	6.4	4.8		3.035	2	0.219
14. Diabetes	14.4	13.4	5.9	12.0		8.482	2	0.014
15. Dental problems	6.3	2.5	3.2	3.3		5.336	2	0.069
16. Kidney problem	3.8	4.9	8.0	5.3		3.693	2	0.158
17. Alzheimer	9.4	17.4	20.3	16.6		8.150	2	**0.017**

Health status by selected background characteristics

In order to assess the overall health status of elderly, each of the health problems of elderly are scored as 0 for presence and 1 for absence of a specific health problem. The overall health status of elderly is grouped in to three categories as good, moderate and poor based on the total score attained by the elderly for all the health problems listed in the study.

The overall health status of elderly by selected background characteristics presented in Table 3 showed that only 4 per cent of elderly were in good health status, 57.6 per cent were in moderate health status and 38.4 per cent were in poor health status. It is observed that sex and marital status of elderly are having significant association with the health status of elderly. The proportion of elderly keeping good / moderate health status is significantly more among male than female.

Table 4: Percent distribution of elderly by their health status and selected background characteristics

Background characteristics	N	Health status			χ^2	DF	P- value
		Poor	Moderate	Good			
All	900	38.4	57.6	4.0			
Age (Years)							
60 – 69	160	33.8	65.0	1.3			
70 – 79	553	39.8	55.5	4.7	6.861	4	0.143
80+	187	38.5	57.2	4.3			
Sex							
Male	414	32.4	61.6	6.0	17.504	2	0.000
Female	486	43.6	54.1	2.3			
Marital status							
Married	398	35.9	58.3	5.8	6.886	2	0.032
Single	502	40.4	57.0	2.6			
Community							
SC / ST	203	39.4	58.1	2.5	8.227	4	0.084
MBC	107	27.1	67.3	5.6			
BC	590	40.2	55.6	4.2			

Significantly higher proportion of married elderly were having good health status than single. Significantly higher proportion of elderly belonged to most backward caste had moderate/ good health status than others. Thus the results indicate that higher proportion of male, married and most backward caste elderly are having comparatively good health status than others.

Major health problems and selected background characteristics

In order to assess the association of some of the major health problems of elderly such as heart problems, blood pressure, arthritis and diabetes with selected background characteristics of elderly, the χ^2 test of significance was used and the

Table 5: Percent distribution of elderly by major health problems and selected background characteristics

Background characteristics	N	Major health problem			
		Heart problem	Blood pressure	Arthritis	Diabetes
All	900	13.4	27.2	62.6	12.0
Age (Years)					
60 – 69	160	16.3	25.6	67.5	14.4
70 – 79	553	14.8	28.2	61.8	13.4
80+	187	13.4	25.7	60.4	5.9
		χ^2– 0.571	χ^2– 0.706	χ^2– 2.151	χ^2 – 8.482
		DF=2	DF=2	DF=2	DF=2
		P<0.752	P<0.706	P<0.341	P<0.014
Sex					
Male	414	13.8	23.7	57.0	12.1
Female	486	15.6	30.2	67.3	11.9
		χ^2–0.621	χ^2– 4.879	χ^2– 10.084	χ^2– 0.004
		DF=1	DF=1	DF=1	DF=1
		P<0.431	P<0.027	P<0.001	P<0.947
Education					
Illiterate	515	14.4	23.7	64.3	7.6
Literate	385	15.3	31.9	60.3	17.9
		χ^2–0 .160; DF=1	χ^2– 7.585	χ^2– 1.514	χ^2– 22.345
			DF=1	DF=1	DF=1

		P<0.689	P<0.006	P<0.219	P<0.000
Earlier occupation					
No work	121	12.4	41.3	64.5	18.2
Coolie	509	13.9	21.8	66.4	7.3
Business	82	17.1	32.9	47.6	22.0
Agriculture	126	17.5	24.6	60.3	9.5
Salaried	62	17.7	41.9	51.6	30.6
		χ^2– 2.318	χ^2– 28.233	χ^2– 14.717	χ^2– 43.999
		DF=4	DF=4	DF=4	DF=4
		P<0.678	P<0.678	P<0.005	P<0.000
Marital status					
Married	398	15.1	27.1	60.6	15.1
Single	502	14.5	27.3	64.1	9.6
		χ^2– 0.050	χ^2–0 .003	χ^2–1.222	χ^2– 6.391
		DF=1	DF=1	DF=1	DF=1
		P<0.823	P<0.959	P<0.269	P<0.010
Religion					
Hindu	796	15.5	26.8	62.1	11.3
Muslim	58	15.5	36.2	72.4	19.0
Christian	46	2.2	23.9	58.7	15.2
		@	χ^2– 2.704	χ^2–2.782	χ^2– 3.478
			DF=2	DF=2	DF=2
			P<0.259	P<0.249	P<0.176
Community					
SC / ST	203	13.8	18.7	68.0	12.3
MBC	107	8.4	28.0	60.7	11.2
BC	590	16.3	30.0	61.0	12.0
		χ^2– 4.645	χ^2– 9.742	χ^2–3.296	χ^2–0 .082
		DF=2	DF=2	DF=2	DF=2
		P<0.098	P<0.008	P<0.192	P<0.960

@ χ^2 not calculated as some of the cell frequencies are less than 5

results are presented in Table 4. The results indicate that the prevalence of diabetes is significantly more among young old (60-80 years) compared to old old (80+ years). The prevalence of blood pressure and arthritis was significantly more among female than male. The prevalence of blood pressure and diabetes is significantly more among literates than illiterates. Significantly higher proportion of married elderly are afflicted with diabetes compared to single. Cardiac problems and blood pressure are significantly more prevalent among BC than SC/ST and MBC elderly. Overall, the results indicate that cardiac problems are significantly more prevalent among BC compared to SC/ST and MBC. Blood pressure is significantly more among female, literate, salaried and backward caste elderly. Prevalence of arthritis is more among female and elderly involved in coolly work in the past. Diabetes is observed to be more among young old, literates, salaried and married elderly. It is inferred from the results that elderly from lower socio economic strata are more disadvantaged to be affected with arthritis while those from higher socio economic strata are more prone to blood pressure. Arthritis is significantly more prevalent among women than men, may be due to their isolation, limited exposure to the outside world and daily household chores even at their old age in rural areas. It is also observed that married elderly are significantly more prone to diabetes than single elderly. Significantly higher proportion of young old (60-69 and 70-79 years) are more prone to diabetes than old old (80+) indicating the increasing trend of the prevalence diabetes in recent times.

Effect of background characteristics on the health problems of elderly

The results of the logistic regression analysis showing the effect of various background characteristics of elderly on some of their major health problems presented in table 5 found that elderly aged 80 years and above are having significantly less chances of getting diabetes compared to elderly aged 60-69 years. Female elderly are having 1.7 times more chances of getting heart problem, 2.4 times more chances of getting blood pressure, 1.8 times more chances of getting arthritics and 2.8 times more chances of getting diabetes compared to male. Literates are having 1.6 times more chances of getting blood pressure and 2.3 times more chances of getting diabetes compared to illiterates. Elderly who had agriculture as their past occupation seemed to have double the chances of getting heart problem compared to those who had no work in the past. Elderly who were coolly in the past have significantly less

Table 6: Logistic regression analysis showing the effect of selected background characteristics of elderly on their health problems

Background Characteristic	Reference	Major health problems							
		Heart ailments		Blood pressure		Arthritis		Diabetes	
		Yes=133Odds ratio	No=767 Significant	Yes=245Odds ratio	No= 655 Significant	Yes=563 Odds ratio	No=337 Significant	Yes=108 Odds ratio	No= 792 Significant
Age (years)									
	60 – 69								
70 – 79		0.910	0.705	1.221	0.345	0.789	0.220	1.067	0.812
80+		0.835	0.566	1.156	0.577	0.808	0.360	0.479	0.069
Sex									
	Male								
Female		1.723	0.067	2.361	0.001	1.835	0.006	2.792	0.003
Education									
	Illiterate								
literate		1.130	0.604	1.558	0.020	1.207	0.272	2.342	0.001
Earlier Occupation									
	No work								
Coolie		1.458	0.256	0.602	0.034	1.274	0.303	0.463	0.025
Business		1.962	0.118	0.991	0.977	0.663	0.190	1.709	0.192
Agriculture		2.057	0.066	0.661	0.176	1.126	0.681	0.630	0.288
Salaried		2.054	0.123	1.505	0.249	0.715	0.332	1.949	0.123
Marital status									
	Married								
Single		0.774	336	0.683	0.084	0.790	0.238	0.480	0.015
Caste									
	SC/ST								
MBC		0.567	0.167	1.634	0.091	0.807	0.400	0.696	0.367
BC		1.210	0.433	1.607	0.026	0.785	0.185	0.681	0.169

Chances of getting blood pressure and diabetes compared to those who had no work. Single elderly are having significantly less chances of getting blood pressure and diabetes compared to married elderly. Most backward caste and backward caste elderly are having significantly more chances of getting blood pressure compared to SC/ST.

Discussion and Conclusion

The study results based on the self-reported signs and symptoms of various diseases as reported by the elderly during the personal interview brought into light the various health problems faced by the them in rural areas. The various diseases reported by the elderly are grouped into 17 categories of diseases and is observed that vision problems and ortho problems are reported to be more prevalent among more than 60 per cent of elderly. Back-pain / slipped disc is also found to be more prevalent with more than one third of elderly. Though these are all the disease more common due to ageing effect, still it is treatable and help the rural elderly to lead a dignified life. Further, prevalence of diseases are more prevalent among female than male except for kidney diseases indicating female are more vulnerable to most of the diseases than male at older ages. Age related problems like eye impairment, frailly and Alzheimer are significantly more prevalent among elderly aged 80+ while the life threatening diseases like lung problems, cardiac problems, high blood pressure and diabetes are observed to be more prevalent among young old aged 60-69 years.

The overall health status assessed based on the number of diseases present in each of the individual elderly also indicate significantly higher proportion of female elderly is in poor health status compared to male elderly. It is also observed that single elderly are more prone to poor health status than married elderly showing the vulnerability of single elderly exposed to various diseases due to poverty. Lack of familial and other support system. The logistic regression analysis indicates that elderly aged 80+ are having nearly 50 percent less chance of contracting diabetes compared to elderly aged 60-69 years. Female elderly seems to have 1.72 times more chances of getting heart ailments; 2.4 times more chances of getting blood pressure, 1.8 times more chances of getting arthritis problems and 2.8 times higher chances of getting diabetes. Thus female elderly are in more disadvantaged position to be afflicted with all most all diseases at older ages. Education explicated negative effect on the health status of elderly. Literates are having more chances to get afflicted with all chronic diseases than illiterates. Elderly involved in salaried job in the past had more chances of getting heart ailments, blood pressure and diabetes indicating the effect of sedentary type of work on the prevalence of chronic diseases.

Overall, the results indicate that all most all elderly aged 60 and above are afflicted with one or other diseases in rural areas. These diseases are mostly due to aging process. However, variation in the prevalence of diseases is observed due to various background characteristics of elderly. Due to poverty, inaccessible public health care system to provide geriatric services, lack of familial and social support system aggravate the disease burden among the elderly in rural areas.

The government should take adequate measures to provide effective geriatric services to the rural elderly through the existing primary health care system. Periodical eye camps and provision of spectacle for the poor elderly would help to remove the major hurdle faced by most of the elderly due to various eye impairments. Provision of geriatric services through special medical camps in collaboration with the primary health centres and private/corporate hospitals for the elderly will help to identify their health problems and get rid of their diseases burden as most of them are inaccessible to geriatric services. Maintaining a permanent registers and records by the village health nurses for each of the elderly and frequent follow up of their health problems and maintaining a good referral system at PHC level will help the vulnerable elderly get regular geriatric services to get relieved from the burden of age related chronic diseases.

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