

A Study of the Gender Differentials in the Prevalence of Chronic Diseases among Elderly based on NSS 52nd and NSS 60th Data

Introduction

It has been well documented that the old age is related to greater incidence of diseases/disabilities and chronic disease is a major component of the burden of illness among the geriatric age group. Elderly women in most settings are more likely than men to experience as well as report poor health and morbidities. Many studies have shown that the number of chronic conditions increases with age and is higher among females than males. But there is dearth of literature that shades light on the trends in gender gap in morbidity among the elderly in developing countries, especially in India. The present study is an attempt to examine the difference in gender gap in the prevalence of chronic diseases among place of residence, Monthly Per Capita Consumption Expenditure (MPCE) and education categories.

Methods and Materials

For the present study the unit level data on morbidity and healthcare from NSS 60th round (2004-05) and NSS 52nd round (1995-96) has been utilized. This part of the survey has been used to extract data for the elderly. This analysis is based on 34831 elderly samples in 2004-05 and 33990 elderly sample in 1995-06. Both the surveys collected information on the nature of spells of ailment of the household members during the last 15 days prior to the survey. This information has been used to calculate the prevalence of chronic diseases among elderly in 1995-96 and 2004-05. The prevalence rate has been defined as the ratio of the number of spells of chronic diseases from which an elderly is suffering in last 15 days prior to the survey per 1000 of the elderly exposed to the risk. The classification of diseases into chronic (lasting for more than 30 days) is in agreement with the 52nd round of NSSO (1996) with the only exception that in this analysis chronic disease does not include disability and other diagnosed and undiagnosed ailments lasting for more than 30 days.

The prevalence of chronic diseases has been calculated separately for male and female elderly according to place of residence (rural & urban), MPCE categories (low, medium and high) and education categories (illiterate and illiterate). This has been used to study the gender gaps and also its decomposition by MPCE tertiles for rural and urban areas.

Statistical analysis

This paper calculates the gender gaps for 2004-05 and 1995-96 and uses it in computing the differences in gender gap at the two specified time points along with the testing of the significance of the differences in gender gaps. Further the difference in gender gap had been decomposed by place of residence, MPCE and education categories.

The difference in gender gaps in the prevalence of chronic diseases denoted by delta (Δ) was calculated as the difference in the prevalence of chronic diseases among females and males.

$$\begin{aligned} \text{Delta } (\Delta) &= \text{Difference in gender gap in the prevalence of chronic diseases in 2004-05 and 1995-96} \\ &= (\text{Gender Gap})_{2004-05} - (\text{Gender Gap})_{1995-96} \\ &= (\text{Prevalence of chronic diseases among females} - \text{Prevalence of chronic diseases among males})_{2004-05} - (\text{Prevalence of chronic diseases among females} - \text{Prevalence of chronic diseases among males})_{1995-96} \end{aligned}$$

The gender gap was calculated separately by place of residence and MPCE category.

Calculation of standard error of delta

Let P_F and P_M be the prevalence of chronic ailment among elderly females and elderly males respectively. Delta and the variance of delta are calculated as follows:

$$\begin{aligned} \text{Delta } (\Delta) &= (P_F - P_M)_{2004-05} - (P_F - P_M)_{1995-96} \\ \text{Var } (\Delta) &= \text{Var} [(P_F - P_M)_{2004-05} - (P_F - P_M)_{1995-96}] \\ &= \text{Var} (P_F - P_M)_{2004-05} + \text{Var} (P_F - P_M)_{1995-96} \\ &= \text{Var} (P_F)_{2004-05} + \text{Var} (P_M)_{2004-05} + \text{Var} (P_F)_{1995-96} + \text{Var} (P_M)_{1995-96} \\ &= [(P_F)(Q_F)/(n_F)]_{2004-05} + [(P_M)(Q_M)/(n_M)]_{2004-05} + [(P_F)(Q_F)/(n_F)]_{1995-96} + [(P_M)(Q_M)/(n_M)]_{1995-96} \end{aligned}$$

The Standard Error (SE) of delta is calculated by taking the square root of variance ie,

$$\text{SE } (\Delta) = \text{SQRT} [\text{Var } (\Delta)]$$

Z -score has been used to test the significance of delta which is obtained by dividing delta by the standard error of delta ie, $Z = [(\Delta) / \text{SE } (\Delta)]$.

The overall share of rural and urban areas in delta is calculated as follows:

Let, Δ_R = Difference in gender gap in rural areas

Δ_U = Difference in gender gap in urban areas

n_R = Sample size in rural area in 2004-05

n_U = Sample size in urban area in 2004-05

C_R = Share of Rural areas in delta (%)

C_U = Share of Urban areas in delta (%)

$$C_R = \{[(n_R) (\Delta_R)] / [(n_R) (\Delta_R) + (n_U) (\Delta_U)]\} * 100$$

Similarly the share of urban areas in delta is given by:

$$C_U = \{[(n_U) (\Delta_U)] / [(n_R) (\Delta_R) + (n_U) (\Delta_U)]\} * 100$$

Further the gender gap in rural and urban areas obtained above has been decomposed by MPCE categories using the following steps:

Let, n_L = Sample size for low MPCE tertile

n_M = Sample size for middle MPCE tertile

n_H = Sample size for high MPCE tertile

Δ_L = Difference in gender gap in low MPCE tertile

Δ_M = Difference in gender gap in middle MPCE tertile

Δ_H = Difference in gender gap in high MPCE tertile

The decomposition of C_R by MPCE category for low medium and high is given by:

$$C_L = \{[(n_L) (\Delta_L)] / [(n_L) (\Delta_L) + (n_M) (\Delta_M) + (n_H) (\Delta_H)]\} * C_R$$

$$C_M = \{[(n_M) (\Delta_M)] / [(n_L) (\Delta_L) + (n_M) (\Delta_M) + (n_H) (\Delta_H)]\} * C_R$$

$$C_H = \{[(n_H) (\Delta_H)] / [(n_L) (\Delta_L) + (n_M) (\Delta_M) + (n_H) (\Delta_H)]\} * C_R$$

Similarly the decomposition of C_U by MPCE category has been done to find out which category of MPCE contributes significantly in delta (Δ) in urban areas. Same procedure has been used to decompose the gender gap in rural and urban areas by education categories.

Results

The overall prevalence of chronic diseases combined for rural and urban areas among elderly was 193 per thousand in 2004-05 and 65 per thousand in 1995-96. The prevalence of chronic diseases among elderly has increased significantly in this decade as shown in Table 1. The increase in the prevalence of chronic diseases between 1995-96 and 2004-05 is more in urban areas as compared to that in rural areas.

The prevalence of chronic diseases is more among females than in males in 2004-05 whereas in 1995-96 the gender gap in the prevalence of chronic disease is almost nil [Table 2]. The gender gap being 18 per thousand in 2004-05 and merely 0.13 per thousand in 1995-96, the difference being statistically significant ($Z=3.64$, $P<0.01$). In rural areas the prevalence of chronic diseases is found to be higher among females in 2004-05 but in 1995-96 it is vice-versa. The gender gap being 11 per thousand in 2004-05 and -3 per thousand (opposite direction) in 1995-96, the difference being statistically significant ($Z=2.65$, $P<0.01$).

While comparing the gender-wise prevalence of chronic diseases among elderly, it was found that the increase in prevalence of chronic diseases was significant both for males [184/thousand in 2004-05 vs 65/thousand in 1995-96, $Z=34.22$, $p<0.01$) and females [202/thousand in 2004-05 vs 66/thousand in 1995-96, $Z=37.81$, $p<0.01$). Overall the increase in prevalence of chronic diseases is more among females as compared to males over the period of time and this is found to be true for rural and urban areas too. The increase in the prevalence of chronic diseases both for male and females is more in urban areas compared to rural areas.

MPCE tertile wise gender gap in the prevalence of chronic ailments

Table 3 shows the results for gender gap for MPCE category. It has been found that among the total population (combined for urban and rural) there is a significant increase in gender gap in the prevalence of chronic diseases in 2004-05 in comparison to 1995-96 for the middle (0.01/thousand in 1995-96 to 24/1000 in 2004-05) and high (0.55/thousand in 1995-96 to 34/thousand in 2004-05) MPCE tertiles.

While analyzing the data for rural and urban areas separately, it was found that in both urban and rural areas the gender gap in the prevalence of chronic diseases among elderly has increased significantly in 2004-05 as compared to 1995-96 for high MPCE category. In addition to this in urban areas there is significant increase in the prevalence of chronic diseases for middle MPCE tertile. Interestingly it was found that in urban areas the prevalence of chronic diseases was more among males as compared to females for all MPCE quintiles and only for low MPCE tertile for rural areas and for country as a whole in 1995-96. While in 2004-05 similar scenario emerged only in low MPCE tertile (Table 3).

Education wise gender gap in the prevalence of chronic ailments

Table 4 shows the results for gender gap for the educational category. Among the total population (combined for rural and urban areas) there is a statistically significant increase in gender gap in 2004-05 in comparison to 1995-96 both for illiterates [5 per 1000 in 1995-96 to 36 per 1000 in 2004-05; $Z=5.46$, $P<0.01$] and literates [23 per 1000 in 1995-96 to 133 per 1000, $Z=9.97$, $P<0.01$]. Also for both rural and urban areas the gender gap was significantly higher in 2004-05 as compared to 1995-96.

Difference in [Delta (Δ)] in gender gaps in 2004-05 vs 1995-96

Overall decomposition of [Delta (Δ)]

Overall, an increase of 18 per thousand has been observed in the gender gap in 2004-05 over 1995-06.

Although there is an increase in gender gaps in both rural and urban areas it is found to be slightly more in urban (15 per thousand) [18 per thousand in 2004-05 to 0.1 per thousand in 1995-06] as compared to the corresponding increase of 14 per thousand in rural area [11 per thousand in 2004-05 to -3 (in opposite direction) per thousand in 1995-96].

On the basis of the calculations shown in 'Methods and Materials', this difference delta (Δ) is accounted for as 63 percent by rural and 37 percent by urban areas [Table 5].

Contribution of MPCE and education in delta (Δ)

Of the total 63 percent contribution of delta by rural areas it is observed that its contribution by MPCE category is 33 percent by high, 24 percent by middle and only six percent by low. Similarly, of 37 percent share of urban areas its decomposition by MPCE category shows that the contribution is mainly from middle (14 percent) and high (24 percent) MPCE tertile [table 6]. Similarly, of the 37 percent share of urban areas, its decomposition by education is literate 26 percent and illiterate 11 percent. Out of 63 percent share of rural areas, the literates and illiterates contributes 36 percent and 27 percent respectively.

Conclusion

The present study made an attempt to analyse the difference in gender gap in two consecutive NSSO rounds on morbidity and healthcare and its contribution according to place of residence and MPCE. It mainly examines an increasing trend in the prevalence of chronic diseases among elderly in India over a period of approximately 10 years from NSS 52nd (1995-96) to NSS 60th round (2004-05). The overall prevalence of chronic diseases among elderly has increased almost three times and also the gender gap has widened to a great extent. Particularly, the gender gap in the prevalence of chronic diseases has increased significantly in rural areas. The prevalence of chronic diseases has increased significantly from 1995-96 to 2004-05 both for males and females. In both the time points the gender gap in the prevalence of chronic diseases is more for urban areas as compared to rural areas. However, the increase in gender gap is found to be more or less similar in both rural and urban areas. In urban area significant contribution is mainly by the middle and high MPCE tertile while in rural areas it the high MPCE tertile that contributes the most. The gender gap in the prevalence of chronic disease is found to be more for literates at both the time periods as compared to illiterates. This result holds true for both the time periods even when the data is disaggregated by place of residence. Of the total increase in gender gap, 63 percent is accounted by rural areas and the rest 37 percent by urban area. Further the increase in gender gap is mainly contributed by high MPCE tertile and literates in both the sectors.

Table 1: Prevalence of chronic ailments among elderly in 1995-96 and 2004-05

Place of Residence	2004-05		1995-96		Significance among Prevalence Rates in 200-05 Vs 1995-96
	% Population	Prevalence/1000	% Population	Prevalence/1000	
Urban	24.27	302	21.92	79	Z=47.3**
Rural	75.73	158	78.08	62	Z=32.6**
Overall	(34831)100	193	(33990)100	65	Z=22.9**

Note: *** Z>2.58 significant at 1%

Table 2: Overall difference [delta (Δ)] in gender gap in chronic ailments among elderly in 2004-05 and 1995-96

Sector & Sex	% Population 2004-05	Prev/1000 2004-05	% Population 1995-96	Prev/1000 1995-96	Significance among prevalence	Delta (Δ)	Significance of delta (Δ)
overall							
M	50.0	184.0	49.4	65.4	Z=34.22**		
F	50.0	202.4	50.6	65.5	Z=37.83**		
gender gap		18.4		0.1		18.3	Z=3.64**
Urban							
M	11.9	392.7	10.7	126.5	Z=32.13**		
F	12.4	431.9	11.2	151.1	Z=32.99**		
gender gap		39.2		24.7		14.6	Z=1.23
Rural							
M	38.2	127.1	38.7	51.2	Z=20.79**		
F	37.6	138.0	39.4	48.2	Z=23.59**		
gender gap		10.9		-3.1		14.0	Z=2.65**

Table 3: Monthly Percapita Consumption Expenditure (MPCE) Tertile-wise difference delta (Δ) in Gender Gap

MPCE and Sex	2004-05		1995-96		Delta (Δ)	Significance of Delta(Δ)
	% Population out of 34831	Prevalence/1000	% Population out of 33990	Prevalence/1000		
Urban						
Low						
Male	1.46	214.9	2.15	26.14		
Female	1.91	201.4	2.60	22.88		
Gender Gap		-13.6		-3.26	-10.30	Z=0.39
Medium						
Male	3.85	272.4	4.48	14.16		
Female	4.48	320.7	4.79	12.70		
Gender Gap		48.3		-1.46	49.77	Z=2.84**
High						
Male	12.33	265.2	12.14	6.97		
Female	12.04	293.0	12.19	5.89		
Gender Gap		27.7		-1.07	28.79	Z=2.94**
Rural						
Low						
Male	13.05	141.1	11.57	1.01		
Female	13.23	144.6	12.62	0.88		
Gender Gap		3.5		-0.13	3.10	Z=0.40
Medium						
Male	12.04	157.7	11.23	2.64		
Female	11.33	170.9	10.90	3.04		
Gender Gap		13.2		0.40	12.75	Z=1.56
High						
Male	7.12	158.1	7.76	12.27		
Female	7.16	188.8	7.57	16.79		
Gender Gap		30.7		4.53	26.20	Z=2.45**
Overall						
Low						
Male	16.44	130.6	15.88	4.25		
Female	16.96	133.8	17.47	4.04		
Gender Gap		3.2		-0.20	3.20	Z=0.63
Medium						
Male	16.85	174.6	16.79	5.38		
Female	16.44	198.1	16.54	5.39		
Gender Gap		23.6		0.01	23.56	Z=3.21**
High						
Male	16.73	256.6	16.77	10.69		
Female	16.58	290.3	16.55	11.24		
Gender Gap		33.8		0.55	33.21	Z=4.43**

Table 4: Education-wise difference delta (Δ) in Gender Gap

Education & Sex	2004-05		1995-96		Delta (Δ)	Significance of Delta(Δ)
	% Population out of 34831	Prevalence/1000	% Population out of 33990	Prevalence/1000		
Urban						
Illiterate						
Male	4.09	175	4.44	51		
Female	10.78	230	12.08	69		
Gender Gap		55		18	37	Z=2.65**
Literate						
Male	13.54	286	14.32	83		
Female	7.66	379	7.50	112		
Gender Gap		93		29	64	Z=4.68**
Rural						
Illiterate						
Male	18.93	118	19.65	54		
Female	28.16	146	28.45	57		
Gender Gap		29		3	25	Z=3.90**
Literate						
Male	13.26	199	10.86	87		
Female	3.54	298	2.59	99		
Gender Gap		99		12	87	Z=4.95**
Total						
Illiterate						
Male	25.18	119	27.43	49		
Female	40.62	156	42.95	54		
Gender Gap		36		5	31	Z=5.46**
Literate						
Male	24.82	261	21.94	97		
Female	9.34	394	7.57	120		
Gender Gap		133		23	110	Z=9.97**

Table 5: Difference [Delta (Δ)] in gender gap in the prevalence of Chronic Ailments and contribution in [Delta (Δ)] by Place of Residence

Place of Residence	Gender gap/1000 in 1995-96	Gender gap/1000 in 2004-05	Delta (Δ) ^s	Population 2004-05 [#] (%)	Contribution in Delta (%) [*]
Overall	0.1	18.4	18.3		
Rural	-3.1	10.9	14.0	75.7	63
Urban	24.7	39.2	14.6	24.3	37

Delta (Δ)^s =Difference in the gender gap in 2004-05 and 1995-96. # Total population in 2004-05 is 34831. *Calculations done as per the formula in Methods and Materials

Table 6: Difference in gender gap [delta (Δ)] in the prevalence of chronic ailments and contribution in [delta (Δ)] by MPCE Tertile and Education

Background Characteristics	Delta(Δ) ^s Urban	Percent population urban 2004-05 #	Contribution in delta(%) [*] Urban	Delta(Δ) ^s Rural	Percent population rural 2004-05 #	Contribution in delta(%) [*] Rural	Delta(Δ) ^s Urban+Rural	Percent population of total 2004-05#	Contribution in delta(%) [*] Urban+Rural
MPCE tertiles									
Low	-10	9.4	-1.0	3	41.1	5.9	3	33.40	3.9
Medium	50	23.1	13.8	13	36.6	24.3	24	33.29	34.7
High	29	67.6	24.2	26	22.3	32.8	33	33.31	61.4
			37.0			63.0			100.0
Education									
Illiterate	37	41.2	10.8	25	73.7	26.9	25	65.8	30.8
Literate	64	58.8	26.2	87	26.3	36.0	87	34.2	69.2
			37.1			62.9			100.0

Delta (Δ)^s =Difference in the gender gap in 2004-05 and 1995-96; # Urban Population=24% of 34831; Rural population is 76% of 34831; *Calculations are based on numbers and not on percentages as per formula