Extended Abstract

Introduction

Non-communicable diseases are the major contributor to mortality and morbidity all over the world. According to WHO 41 million deaths each year are contributed by NCDs, accounting 71% of all global deaths ("Noncommunicable diseases," 2018). Global burden of disease study shows that 21 out of 30 leading causes of years lived with disability (YLDs) are contributed by NCDs (Vos et al., 2017). As India is passing through both demographic and epidemiological transition, there is a shift from communicable diseases to non-communicable diseases and the burden of NCDs has increased with a significant pace in past few decades Trend suggests that the percentage share of NCDs will in increase in future (Yadav & Arokiasamy, 2014). About 60% (5.87 million) of all deaths in India are attributed to NCDs, 2/3rd of the total deaths caused by NCDs in South-East Asia Region (SEAR) are contributed by India ("Burden of NCDs and their risk factors in India," n.d.).

In 2015 India signed the declaration on the 2030 agenda for sustainable development goals, which includes reduced inequalities as one of its goals. In the present study, we have tried to map the socioeconomic disparities and inequalities in the prevalence of NCDs in India with four chronic NCDs (Diabetes, Hypertension, Goiter, Obesity)

Methodology

The data of the fourth iteration of National Family Health Survey (NFHS-4) which was conducted in 2015-2016, were used for the present study. NFHS is Indian version of Demographic Health Survey (DHS).

In the present study, we have taken 3 Major NCDs Diabetes Hypertension, and Goiter to estimate socioeconomic inequalities. We have also included obesity in the study, which is a major risk factor of various NCDs and categorized as a disorder in ICD classification.

For the representation of socioeconomic status (SES) the wealth index data were used which was collected in NFHS-4. The wealth index was calculated on the basis of some parameters like income, ownership of some selected assets, etc. on the basis of assets and income the population was divided into 5 parts (poorest, poorer, middle, richer and richest).

To show the inequality in the prevalence of NCDs among the wealth quantiles concentration curve (CC) and related Concentration Index (CI) were calculated. The concentration curves were made by the method suggested by world bank ("The Concentration Index," n.d.).

For further clarification odds ratios were calculated using binary logistic regression. To show the inequality among different wealth quantiles in rural and urban areas separately the odds ratios were calculated for rural, urban and also for the total population.

Results

Table-1 is showing the prevalence and Concentration Index (CI) of selected NCDs across various wealth quantiles.

The overall prevalence of diabetes was 1.75 percent in urban areas the prevalence was 2.6 percent and in rural areas, it was 1.3 percent. In the poorest population group, the prevalence was 0.84 percent and in the richest population group the prevalence was 2.97 percent. We can see from the table that the prevalence increases as we move from poorest wealth group to richest wealth group, the same pattern of the prevalence among the wealth groups we found in both urban and rural areas. The value of concentration index for total population was found to be 0.26, the value of CI for urban areas was 0.18 and for rural area it was 0.22.

Table 1

	Diabetes			Hypertension			Goiter			Obesity		
Wealth Index	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
poorest	1.62	0.8	0.84	11.08	9.97	10.03	1.09	0.66	0.68	1.33	0.47	0.64
poorer	1.16	0.96	0.99	10.31	10.39	10.38	1.33	1	1.04	2.22	1.28	1.37
middle	1.62	1.31	1.39	11.87	11.12	11.31	2.04	1.49	1.63	4.49	2.74	3.1
richer	2.57	2.04	2.3	13.25	12.74	13	2.71	2.09	2.4	7.17	4.98	5.67
richest	3.21	2.31	2.97	12.94	13.72	13.15	4.11	2.85	3.77	11.89	7.46	8.89
Total	2.6	1.3	1.75	12.65	11.12	11.65	3.1	1.36	1.96	8.91	2.96	4.8
Concentration Index	0.18	0.22	0.26	0.048	0.068	0.061	0.26	0.27	0.31	0.38	0.41	0.42

The concentration index for hypertension was found to be 0.061 which is showing a very low inequality in the prevalence of hypertension among various wealth groups. The prevalence of hypertension was 10.03 percent in poorest population and 13.15 percent in the richest population, the data is showing that the prevalence increases with increase in wealth index but the amount of increase is very less.

The value of CI is 0.38 for goiter which is showing that a significant amount of inequality is present in the prevalence of goiter. Similarly, there is very high inequality is present in the prevalence of obesity across various wealth groups. We can see from the table that obesity (CI = 0.42) is highly concentrated among the rich in both urban and rural areas, the prevalence of obesity was 0.64 percent among the poorest, on the other hand, the prevalence among the richest was 8.89%.

We can also see from the table that there is not a wide difference between the values of CI for urban and rural. The value of CI for diabetes for urban and rural areas was 0.18 and 0.22 respectively. These values of CI are showing that similar kind of inequality (of the prevalence of NCDs across various wealth groups) is prevalent in both urban and rural areas.

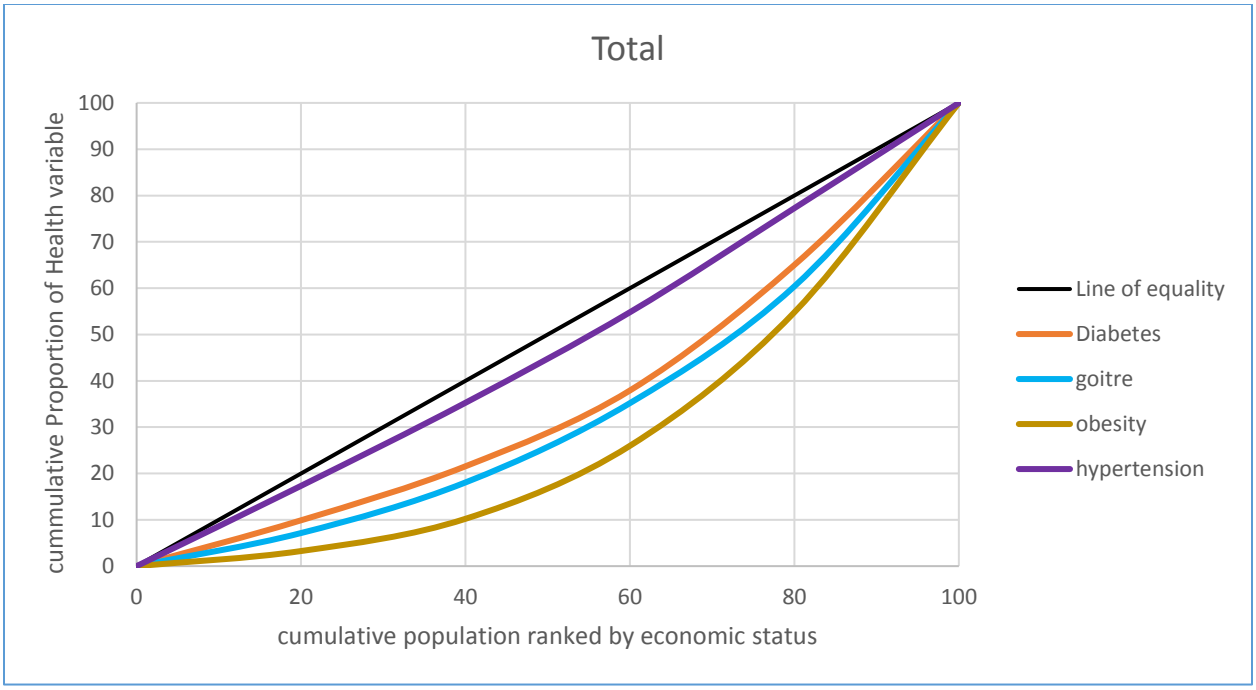

Figure 1: concentration curve (overall)

Figure-1 is showing the concentration curve for the selected NCDs. The figure is clearly depicting that inequality in the prevalence of obesity is very high and for hypertension inequality is relatively low

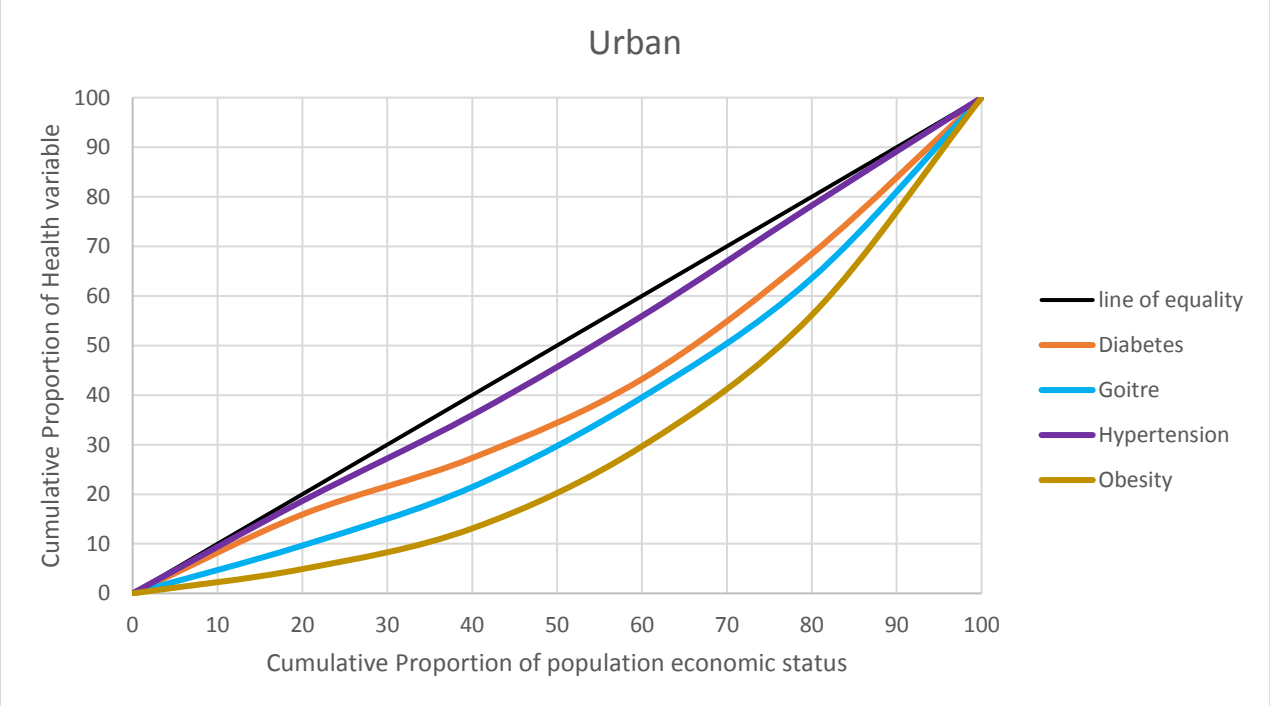

Figure 2 concentration curve for Urban area

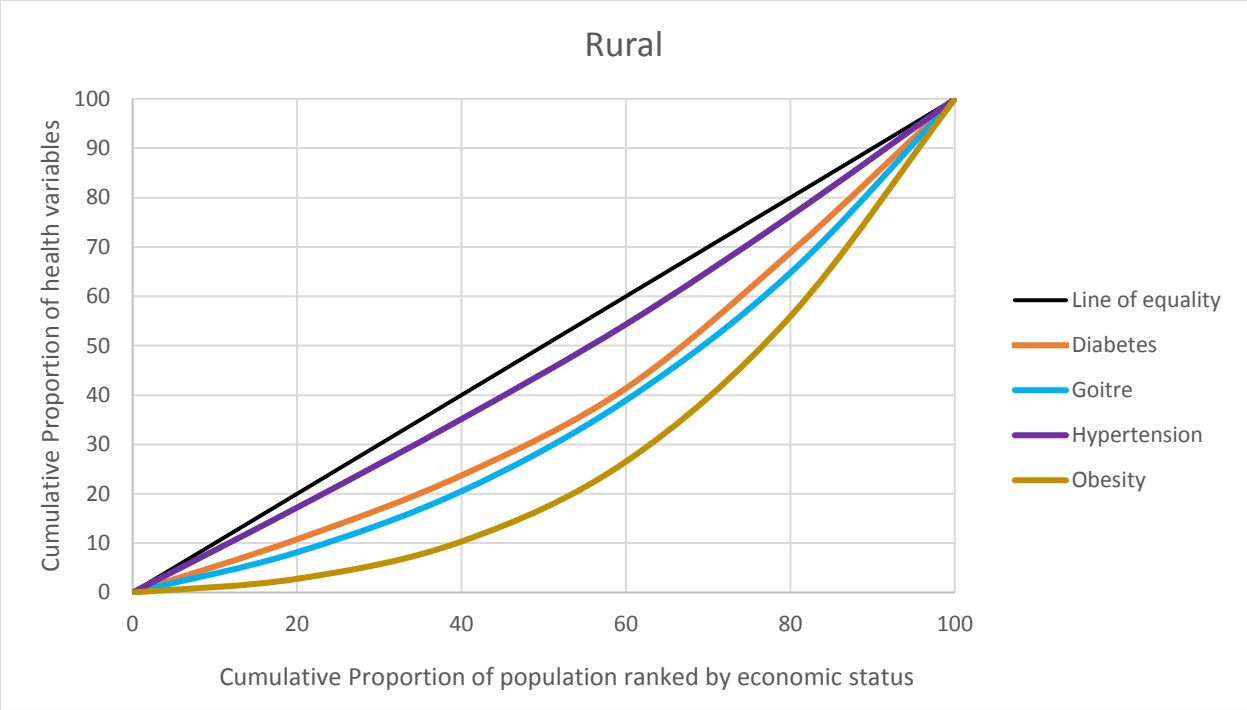

Figure 3 concentration curves for rural area

From figure-2 and figure-3 we can see that concentration curves are approximately similar for the selected NCDs which is depicting that there is similar kind of inequality in both rural and urban areas across various wealth groups.

Table 1 is showing the odds ratios. For diabetes the OR was 3.613 for the richest group which is showing that the chance of having diabetes is 3.6 times more in the richest group than the poorest group. We can see a similar kind of situation for Goiter and obesity. The highest odds ratios were found in case of obesity the chance of becoming obese were 13 times high in richest group than the poorest group. For hypertension the inequality is not that much high, the chance of having hypertension was 1.35 times more among the richest group then the poorest group.

If we compare the odds ratios for urban and rural then we can see that there is not a wide difference in the odds ratios, for example if we take the case of Goiter then for urban area the odds ratio for richest was 3.9 and for rural are it was 4.42, which is showing similar kind of interpretation.

Discussion and Conclusion

The present study describes the socioeconomic inequality of four NCDs. The inequality is shown separately for both urban and rural areas. The values of concentration index and odds ratios are showing that the NCDs are more prevalent among the rich Indians. Except for hypertension, the inequality was decently high for rest of the three NCDs. There are various studies showing increased risk of CVDs and NCDs among the rich Indians ((Reddy et al., 2007), (Singh, Nanda, & Singh, 2017), (Bartley, Fitzpatrick, Firth, & Marmot, 2000), (Vellakkal et al., 2013)). Though there are other studies showing that risk factors of NCDs are more prevalent among the poor (Siegel, Patel, & Ali, 2014).

In the present study, we found that wealthy stratum of the population is at higher risk of diabetes, hypertension, goiter, and obesity. So keeping the vulnerable groups in mind a targeted intervention approach should be there to address the growing burden of NCDs and risk factors related to it.

Table 1: Odds Ratio's

	Urban		Rural		Total	
	OR	95% CI	OR	95% CI	OR	95% CI
Diabetes						
poorest ®					-	
poorer	**0.7******	**0.46 - 1.09**	**1.2***	**1.08 - 1.35**	**1.17****	**1.05 - 1.31**
middle	**1******	**.68 - 1.47**	**1.65***	**1.48 - 1.84**	**1.66***	**1.50 - 1.84**
richer	**1.6******	**1.1 - 2.3**	**2.59***	**2.33 - 2.88**	**2.78***	**2.51 - 3.07**
richest	**2***	**1.39 - 2.92**	**2.94***	**2.62 - 3.3**	**3.613***	**3.27 - 3.98**
Hypertension						
poorest ®					-	
poorer	**.92******	**.80 - 1.06**	**1.04****	**1.01 - 1.08**	**1.03****	**1.00 - 1.07**
middle	**1.08******	**.95 - 1.22**	**1.12***	**1.09 - 1.16**	**1.14***	**1.10 - 1.18**
richer	**1.22***	**1.08 - 1.38**	**1.31***	**1.27 - 1.36**	**1.34***	**1.29 - 1.38**
richest	**1.19****	**1.05 - 1.34**	**1.43***	**1.37 - 1.49**	**1.35***	**1.31 - 1.40**
Goiter						
poorest ®					-	
poorer	**1.23******	**.78 - 1.93**	**1.52***	**1.35 - 1.71**	**1.53***	**1.36 - 1.72**
middle	**1.89****	**1.27 - 2.83**	**2.28***	**2.03 - 2.57**	**2.42***	**2.17 - 2.7**
richer	**2.52***	**1.71 - 3.73**	**3.21***	**2.86 - 3.61**	**3.57***	**3.22 - 3.97**
richest	**3.89***	**2.65 - 5.73**	**4.42***	**3.93 - 4.97**	**5.72***	**5.17 - 6.32**
Obesity						
poorest ®						
poorer	**1.4******	**0.64 - 3.1**	**2.07***	**1.59 - 2.69**	**2.02***	**1.57 - 2.59**
middle	**2.67*****	**1.3 - 5.49**	**4.31***	**3.38 - 5.50**	**4.16***	**3.31 - 5.23**
richer	**5.57***	**2.76 - 11.25**	**7.62***	**5.99 - 9.68**	**7.95***	**6.38 - 9.91**
richest	**9.18***	**4.56 - 18.47**	**12.34***	**9.70 - 15.71**	**13.4***	**10.86 - 16.75**

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