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BURDEN OF NON-COMMUNICABLE DISEASES ON TWO DIFFERENT DIVISION OF UTTARAKHAND: ADULT HEALTH INDICATOR

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ABSTRACT

Background: About 61% of deaths in India are attributed to Non-Communicable Diseases (NCDs).The distribution of NCDs amongst different regions of the state represents adult health status and has its social, political and economic implications.In the present study, we evaluate health status with an objective to compare distribution of NCDs between the two regions of Uttarakhand: Garhwal and Kumaun. **Material and Methods:** The study was carried out from the secondary data source i.e. NFHS-4 data of Uttarakhand which is divided into two regions, Garhwal and Kumaun. Z-test is used for comparison between two regions and within inter districts of Uttarakhand. **Results:** The study indicates that between the two divisions Kumaun has better health status where the proportion of population suffering from NCDs was comparatively lower than Garhwal. Champawat from the Kumaun division has much less proportion of NCD in comparison to the other districts in the division, while Bageshwar recorded the maximum. Pauri-Garhwal in Garhwal region accounted for minor proportion of population suffering from NCD, while Dehradun and Haridwar had major proportions. **Conclusion:** Though overall health status of Uttarakhand is far better than other states in India but between the two divisions, Garhwal requires more attention in terms of healthcare facilities and awareness programmes. In fact, certain districts in Kumaun also require intervention from the Government to improve health quality. Both hilly and urban districts have different issues, which needs to be targeted to improve the health quality of the state.

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INTRODUCTION

Since the emergence of Uttarakhand as a new state, there has been intense urbanization at considerable rate; this transitional shift affects state as well as public in general. The region consists of two distinct realms of Garhwal and Kumaun, with 13 districts, which differ from each other in terms of geographic and demographic distribution (Kukreti, 2013). These differences lead to unequal distribution of the resources and wealth dictating the socio-economic status of the regions.
NCDs are leading cause of death globally, accounting for 61.8% morbidity in India that will increase by over 20% in near future. Most NCDs are associated with 21st century lifestyle, leading to four key metabolic/physiological changes, raised blood pressure, overweight/obesity, hyperglycemia and hyperlipidemia. Overweight and obesity leads to adverse metabolic effects on the blood pressure whereas increased blood pressure is major risk factor associated with Ischemic heart disease, coronary heart diseases and hemorrhagic stroke. In addition, deficiency of iron could lead to impaired body functions and result in anemia (Global status report on non-communicable diseases, 2011). According to a report by ICMR, PHFI and IHM the leading cause for Disability Affected Life Years (DALY) in Uttarakhand were Ischemic heart diseases (7.8%), COPD (6.8%), diabetes (2.2%), stroke (2.2%), iron deficiency anemia (2.2%) amongst the others. The risks factors characterized as behavioral, metabolic and environmental are associated with various NCDs and the report suggests that in Uttarakhand behavioral risk factor causes more DALY followed by metabolic risk factors (Global status report on non-communicable diseases, 2011 and Indian

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Council of Medical Research, 2017). To improve the distribution of resources in the areas with poor health status, it is necessary to locate and recognize those regions and find sustainable and remedial, process and programmes. Hence, the regional analysis has a pivotal role in the development planning process (Meintjes, 2001).

Objectives

- To mine database for NCDs and compare it between two regions of Uttarakhand: Garhwal and Kumaun.
- To compare Adult Heath Status in inter districts of Garhwal region.
- To compare Adult Health Status in inter districts of Kumaun region.

MATERIAL AND METHODS

For studies data mining was done using publically available secondary database provided by International Institute for Population Sciences (IIPS) on National Family Health Surveys 4 conducted in 2015-2016 (International Institute for Population Sciences and ICF, 2017) NFHS-4 fieldwork for Uttarakhand was from 30 January 2015 to 19 July 2015 by Institute of Health Management Research (IIHMR University) and gathered information from 15,171 households in which 17,300 are women and 1,994 are men. Along with this data was assessed from the fact sheets for each district of Uttarakhand (Annual Health Survey, 2011).

Statistical Analysis

The Z test for two-population proportion has been applied for different study indicators. P-value is calculated, if $p > 0.05$, H_0 is accepted, and if $p < 0.05$, then H_0 is rejected at 5 % of level of significance.

RESULTS

The health status of Uttarakhand and its regions under study is presented in Table: 1, where differences in distribution of NCDs is assessed between Garhwal and Kumaun. It is observed that there is a significant difference between the two regionswith respect to BMI amongst men, both underweight (p-value 0.024) and obese (p-value 0.005).Garhwal recorded higher difference in distribution of obese men (p-value 0.007) and obese women (p-value 0.009). A significant difference in distribution of anemic children, aged 6-59 months is also noted (p-value 0.036); Kumaunhas more difference in distribution (p-value 0.000) than Garhwal (p-value 0.020). Overall, major fractions of anemic women, age 15-49 are concentrated around Kumaun region (p-value 0.001); where proportion of non-pregnant anemic women is higher in Kumaun (p-value 0.000) and higher amongst pregnant women in Garhwal (p-value 0.000). In addition, anemic men are more widespread in Garhwal (p-value 0.017). Distribution of NCDs amongst districts in Kumaun region namely; Almora, Pithoragarh, Bageshwar, Champawat, Nainital and Udham Singh Nagar is presented in Table: 2, which depicts that major portion of

Table 1. **Comparison of Health status between Kumaun-Garhwal, Kumaun-Uttarakhand & Garhwal-Uttarakhand**

Indicators	Kumaon (k)	Garhwal (g)	Uttarakhand (u)	K vs. G [p –value]	K vs. U [p –value]	G vs. U [p –value]
BMI						
Women whose Body Mass Index (BMI) is below normal (BMI < 18.5 kg/m^2)%	20.02	16.93	18.4	0.073	0.363	0.379
Men whose Body Mass Index (BMI) is below normal (BMI < 18.5 kg/m^2)%	19.15	15.31	16.1	0.024	0.069	0.624
Women who are overweight or obese (BMI = 25.0 kg/m^2)%	17.92	15.96	20.4	0.234	0.156	0.009
Men who are overweight or obese (BMI = 25.0 kg/m^2)%	17.87	13.29	17.7	0.005	0.904	0.007
ANEMIA						
Children age 6-59 months who are anemic (<11.0 g/dl) (%)	45.02	49.74	54.9	0.036	0.000	0.020
Non-pregnant women age 15-49 years who are anemic (<12.0 g/dl) (%)	33.83	36.79	41.4	0.162	0.000	0.035
Pregnant women age 15-49 years who are anemic (<11.0 g/dl) (%)	37.82	35.01	43.9	0.194	0.006	0.000
All women age 15-49 years who are anemic (%)	33.97	36.86	41.5	0.190	0.001	0.032
Men age 15-49 years who are anemic (<13.0 g/dl) (%)	13.4	10.63	14.1	0.054	0.653	0.017
BLOOD SUGAR LEVEL						
Women						
Blood sugar level - high (>140 mg/dl) (%)	6.367	5.143	6.1	0.211	0.779	0.332
Blood sugar level - very high (>160 mg/dl) (%)	2.217	2.186	2.5	1.000	0.660	0.660
Men						
Blood sugar level - high (>140 mg/dl) (%)	9.567	7.071	8.8	0.043	0.535	0.159
Blood sugar level - very high (>160 mg/dl) (%)	4.25	3.1	4.6	0.190	0.741	0.082
HYPERTENSION						
Women						
Slightly above normal (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg) (%)	7.733	5.886	7.3	0.110	0.728	0.208
Moderately high (Systolic 160-179 mm of Hg and/or Diastolic 100-109 mm of Hg) (%)	1.633	1.143	1.6	0.002	1.000	0.332
Very high (Systolic =180 mm of Hg and/or Diastolic =110 mm of Hg) (%)	0.733	0.471	0.8	0.562	0.795	0.407
Men						
Slightly above normal (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg) (%)	15.15	11.77	13.4	0.026	0.250	0.280
Moderately high (Systolic 160-179 mm of Hg and/or Diastolic 100-109 mm of Hg) (%)	2.85	2.371	3.3	0.484	0.603	0.226
Very high (Systolic 180 mm of Hg and/or Diastolic 110 mm of Hg) (%)	1.183	0.3	0.8	0.020	0.368	0.131
WOMEN AGE 15-49 YEARS WHO HAVE EVER UNDERGONE EXAMINATIONS OF:						
Cervix (%)	20.42	15.6	16.7	0.005	0.033	0.503
Breast (%)	8.433	7.343	8.5	0.363	0.936	0.322
Oral cavity (%)	13.55	10.69	12.4	0.055	0.424	0.234

Table 2. Comparison of distribution of NCDs in Kumaun region with its district

Indicators	Kumaon	Almora	Pithoragarh	Bageshwar	Champwat	Nainital	Udam singh
BMI							
Women whose Body Mass Index (BMI) is below normal (BMI < 18.5 kg/m^2)%	20.02	24.8(0.010)	13.5(0.0001)	24.9(0.008)	20.6(0.741)	17.2(0.107)	19.1(0.61)
Men whose Body Mass Index (BMI) is below normal (BMI < 18.5 kg/m^2)%	19.15	32.5(0.0)	8.2(0.0)	13.8(0.0014)	21.6(0.164)	18.6(0.77)	20.2(0.535)
Women who are overweight or obese (BMI = 25.0 kg/m^2)%	17.92	9.2(0.0)	19(0.529)	10.2(0.0)	17.1(0.638)	27.2(0.0)	24.8(0.0002)
Men who are overweight or obese (BMI = 25.0 kg/m^2)%	17.87	13.7(0.010)	18.3(0.818)	16.7(0.478)	19.3(0.424)	21.3(0.055)	17.9(1)
ANEMIA							
Children age 6-59 months who are anemic (<11.0 g/dl) (%)	45.02	39.7(0.016)	31.9(0)	39.8(0.0188)	40.1(0.026)	54(0.0)	64.6(0.0)
Non-pregnant women age 15-49 years who are anemic (<12.0 g/dl) (%)	33.83	25.3(0.0)	26.3(0.0003)	33.8(1)	30.2(0.084)	35.1(0.54)	52.3(0.0)
Pregnant women age 15-49 years who are anemic (<11.0 g/dl) (%)	37.82	23.7(0.0)	34.4(0.114)	44.3(0.003)	30(0.00024)	41.5(0.091)	53(0.0)
All women age 15-49 years who are anemic (%)	33.97	25.2(0.0)	26.6(0.0003)	34.2(0.928)	30.2(0.069)	35.3(0.54)	52.3(0.0)
Men age 15-49 years who are anemic (<13.0 g/dl) (%)	13.40	12.9(0.74)	7.4(0.0)	13.9(0.741)	15.2(0.25)	13.5(0.944)	17.5(0.011)
BLOOD SUGAR LEVEL							
Women							
Blood sugar level - high (>140 mg/dl) (%)	6.37	4.8(0.119)	6.4(1)	4.3(0.0366)	8(0.167)	7.3(0.423)	7.4(0.379)
Blood sugar level - very high (>160 mg/dl) (%)	2.22	1.2(0.084)	1.7(0.418)	1.9(0.638)	2.5(0.66)	2.7(0.47)	3.3(0.133)
Men							
Blood sugar level - high (>140 mg/dl) (%)	9.57	5.4(0.0003)	9.2 (0.75656)	12.6(0.032)	10.7(0.42)	8.8(0.535)	10.7(0.42)
Blood sugar level - very high (>160 mg/dl) (%)	4.25	3.2(0.238)	3.8(0.64552)	1.9(0.0028)	6.7(0.014)	3.8(0.645)	6.1(0.055)
HYPERTENSION							
Women							
Slightly above normal (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg) (%)	7.73	8.2(0.68)	7.3(0.728)	4.3(0.00139)	8.9(0.332)	9.4(0.173)	8.3(0.624)
Moderately high (Systolic 160-179 mm of Hg and/or Diastolic 100-109 mm of Hg) (%)	1.63	1.2(0.45)	1(0.238)	0.7(0.0588)	2(0.503)	2.1(0.406)	2.8(0.067)
Very high (Systolic =180 mm of Hg and/or Diastolic =110 mm of Hg) (%)	0.73	0.2(0.095)	0.9(0.617)	0.9(0.617)	0.2(0.095)	0.9(0.62)	1.3(0.177)
Men							
Slightly above normal (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg) (%)	15.15	15.8(0.67)	17(0.246)	12.4(0.080)	17.1(0.22)	13.6(0.34)	15(0.952)
Moderately high (Systolic 160-179 mm of Hg and/or Diastolic 100-109 mm of Hg) (%)	2.85	3.3(0.516)	1.1(0.005)	0.8(0.0007)	2.9(0.896)	4.5(0.042)	4.5(0.042)
Very high (Systolic =180 mm of Hg and/or Diastolic =110 mm of Hg) (%)	1.18	1.2(1)	0(0.0005)	2.2(0.082)	1.8(0.271)	0(0.0052)	1.9(0.204)
WOMEN AGE 15-49 YEARS WHO HAVE EVER UNDERGONE EXAMINATIONS OF:							
Cervix (%)	20.42	26.6(0.0012)	28.6(0)	16.9(0.044)	17.7(0.123)	22(0.38)	10.7(0.055)
Breast (%)	8.43	12.6(0.002)	7.9(0.682)	4.1(0.00008)	7.6(0.509)	10.2(0.16)	8.2(0.873)
Oral cavity (%)	13.55	17.2(0.021)	13.5(1)	10.1(0.018)	12.4(0.46)	17.4(0.01)	10.7(0.055)

Table 3. Comparison of distribution of NCDs in Garhwal region with its district

Indicators	Garhwal	Haridwar	Rudraprayag	Tehrigarhwal	Pauri garhwal	Chamoli	Dehradun	Uttarkashi
BMI								
Women whose Body Mass Index (BMI) is below normal (BMI < 18.5 kg/m^2)%	16.92	20.7(0.03)	14.8(0.197)	18.1(0.48)	16.6(0.86)	15.2(0.30)	16.2(0.67)	16.9(1)
Men whose Body Mass Index (BMI) is below normal (BMI < 18.5 kg/m^2)%	15.31	17.1(0.27)	17.3(0.23)	16.2(0.58)	18.4(0.064)	12.8(0.107)	9(0.0)	16.4(0.503)
Women who are overweight or obese (BMI = 25.0 kg/m^2)%	15.96	24(0)	12.4(0.024)	5.3(0.0)	17.5(0.34)	16.6(0.67)	24.4(0.0)	11.5(0.004)
Men who are overweight or obese (BMI = 25.0 kg/m^2)%	13.28	19.3(0.0)	10.7(0.073)	5.9(0.0)	14(0.64)	10.2(0.031)	21.6(0)	11.3(0.17)
ANEMIA								
Children age 6-59 months who are anemic (<11.0 g/dl) (%)	49.74	71.1(0.0)	50.1(0.857)	42.2(0.0007)	50(0.89)	36.7(0.0)	50.2(0.82)	47.9(0.42)
Non-pregnant women age 15-49 years who are anemic (<12.0 g/dl) (%)	36.78	54.9(0.0)	29.9(0.001)	32.9(0.0672)	36.4(0.8493)	27(0.0)	41.9(0.019)	34.5(0.28)
Pregnant women age 15-49 years who are anemic (<11.0 g/dl) (%)	35.01	61.7(0.0)	43.6(0.0000)	29.9(0.014)	*()	36.2(0.575)	33.4(0.45)	40.3(0.014)
All women age 15-49 years who are anemic (%)	36.86	55.3(0.0)	30.3(0.0021)	32.8(0.06)	36(0.71)	27.3(0.0)	41.5(0.031)	34.8(0.35)
Men age 15-49 years who are anemic (<13.0 g/dl) (%)	10.63	18.6(0.0)	8.1(0.055)	9.2(0.29)	6.8(0.0026)	12.2(0.258)	14.5(0.008)	5(0.0)

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BLOOD SUGAR LEVEL								
Women								
Blood sugar level - high (>140 mg/dl) (%)	5.14	6.5(0.180)	3.9(0.197)	4.4(0.45)	7.1(0.061)	3.9(0.197)	5.7(0.55)	4.5(0.53)
Blood sugar level - very high (>160 mg/dl) (%)	2.18	2.6(0.562)	1.6(0.327)	1.5(0.25)	3.2(0.167)	1.9(0.638)	2.4(0.764)	2.1(0.88)
Men								
Blood sugar level - high (>140 mg/dl) (%)	7.07	9.7(0.036)	4.5(0.0128)	9.6(0.043)	5.4(0.116)	1.8(0.0)	8.5(0.24)	10(0.0)
Blood sugar level - very high (>160 mg/dl) (%)	3.1	4.6(0.082)	2.4(0.337)	3.2(0.896)	1.8(0.060)	0.9(0.0004)	6.5(0.0008)	2.3(0.271)
HYPERTENSION								
Women								
Slightly above normal (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg) (%)	5.88	7.6(0.128)	5.2(0.496)	3.8(0.028)	6(0.928)	6(0.93)	7.3(0.208)	5.3(0.562)
Moderately high (Systolic 160-179 mm of Hg and/or Diastolic 100-109 mm of Hg) (%)	1.14	1.8(0.19)	1(0.82)	0.4(0.070)	2.4(0.026)	0.5(0.131)	0.9(0.653)	1(0.82)
Very high (Systolic =180 mm of Hg and/or Diastolic =110 mm of Hg) (%)	0.47	1.2(0.087)	0.1(0.101)	0.3(0.478)	0(0.0251)	0.6(0.764)	0.9(0.285)	0.2(0.254)
Men								
Slightly above normal (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg) (%)	11.77	13.3(0.31)	15.1(0.030)	3.3(0.0)	18(0.0001)	13.9(0.161)	12.7(0.541)	6.1(0.0)
Moderately high (Systolic 160-179 mm of Hg and/or Diastolic 100-109 mm of Hg) (%)	2.37	2.9(0.484)	0(0.0)	0(0.0)	4(0.0423)	2.2(0.76418)	3.8(0.0703)	3.7(0.09102)
Very high (Systolic =180 mm of Hg and/or Diastolic =110 mm of Hg) (%)	0.3	0.4(0.704)	0(0.085)	0(0.08364)	0(0.08364)	0(0.08364)	1.1(0.031)	0.6(0.31732)
WOMEN AGE 15-49 YEARS WHO HAVE EVER UNDERGONE EXAMINATIONS OF:								
Cervix (%)	15.6	13.7(0.23)	22.9(0.0)	12.6(0.0536)	11.1(0.00308)	20.6(0.00374)	20.1(0.00854)	8.2(0.0)
Breast (%)	7.34	10.5(0.0121)	6(0.242)	6.7(0.59612)	7.1(0.86502)	6.7(0.59612)	7.8(0.67448)	6.6(0.53526)
Oral cavity (%)	10.68	9.8(0.509)	11.7(0.477)	5.6(0.0)	12.2(0.29372)	10(0.61006)	15.7(0.0009)	9.8(0.50926)

population in districts of Bageshwar suffer from NCDs, followed by Almora, Pithoragarh, Udham Singh Nagar, Nainital and Champawat indicating the general health status of these locations. Table 3, represent distribution of NCDs in different districts of Garhwal region i.e. Haridwar, Tehri-Garhwal, Rudraprayag, Pauri-Garhwal, Chamoli, Dehradun and Uttarkashi. Overall, maximum proportion of NCDs is present in Dehradun and Haridwar district followed by Rudraprayag, Tehri-Garhwal, Chamoli, Uttarkashi and Pauri-Garhwal indicating the health status of the region.

DISCUSSION

The present study indicates that there is a considerable difference between the distributions of NCDs across the two divisions in the state, suggesting variability in distribution of healthy population. Out of two divisions, Garhwal has higher proportion of individuals with NCDs in comparison to Kumaun. This could be due to the fact Garhwal has higher percent of rural area under its territory, thus dictating the level of health facilities, education and overall status of NCDsprevalence (Census of India, 2011). In the Garhwal region, major proportion of NCDs are present in Haridwar and Dehradun district, Haridwar in spite being prosperous district of Uttarakhand, lackseducation and general awareness leading to poor health status. Frequent cases of anemia in Haridwar are attributed to illiteracy, which results in poor family planning thus depleting the health of both mother and child. Studies show that, literacy status of parents has effects on general well being of children. Obesity and hypertensionin both districts have been associated with unhealthy eating habits, lack of exercise, stress, competitive environment and internet leading to a sedentary lifestyle, thus affecting economic well-being of the state (Joshi, 2017; Azad, 2015; Chaudhary, 2008; Azad, 2015 and Hasan, 2012). Other major cause for NCDs is pollution and urbanization, which disrupts and interferes with the health of individuals, a high level of particulate matter, has been identified in both Dehradun and Haridwar (Dahiya). Tehri district recorded a comparatively high proportion of both obese men and women, which is linked to the sedentary lifestyle of people and lack of education. According to studies, nutritional deficiency in the area can be a factor responsible for anemic population. The health facilities have shortage of work force and limited resources for education especially higher education, resulting in anemic population in the district. In fact, Tehri-Garhwal has the least percentage of literacy amongst all districts in Garhwal region. Another major problem in the region is alcoholism; it has detrimental effect on the health of an individual.

In recent studies, alcohol has been associated with hypertension and enhanced number of hypertensive people could be related to this behavioral hazard in the region (Census of India, 2011; Sharma, 2013; Husain, 2014 and Thapliyal, 2014). Similarly, in Chamoli and Uttarkashi district high number of NCDs can be accredited to lifestyle and behavioral risks, smoking and tobacco has been a major problems in the Chamoli districts that causes complications and have been associated with NCDs. Lack of education, nutritional deficiency and Alcohol consumption aggravates the health crisis in Uttarkashi (Census of India, 2011 and Husain, 2014).

Pauri Garhwal in past many years has seen migration, resulting in lack of human resources. Lack of primary health care facilities, absenteeism of the health staff and water crises presents unfavorable circumstances for the people in the area, which in turn leads to physiological stress, which could be associated with high number of individuals suffering for hypertension in this district (Rawat, 2017 and Pooja and Bamrara, 2013). Health status of Kumaun is much better than Garhwal, which could be associated with higher percentage of urban area under its territory (Census of India, 2018). Despite that, there is discrepancy in the distribution of NCDs in the region. Bageshwar recorded highest distribution of health concerns followed by Almora district. Lack of awareness is one of the major reasons for nutritional deficiency amongst people. People are not aware of the dietary requirements, which cause notable increase in people with low BMI, obesity in the region amongst women is prevalent due to high amount of stress caused from overburden of work andresource limitations to earn livelihood (Kukreti, 2013 and Chand, 2017). Lack of nutrition amongst women can be associated with anemic population in the region. Alcohol consumption is highest in this district dictating prevalence of hypertension amongst men (Census of India, 2011).

Despite being a flourishing district Udham Singh Nagar has deplorable health status, lack of education, illiteracy and consumption of tobacco are considered as major force to drive the depleting health status of the population (Global, 2011). Anemia and obesity amongst women married/unmarried is very prevalent in the area, due to lack of education, poor family planning and poor nutritional levels (Azad, 2015; Chaudhary, 2008 and Thapliyal, 2014). Nainital is another district that has higher proportion of men suffering from raised levels of blood pressure, which could be attributed to lack of employment in the area and stressful lifestyle, urbanization and intense pressure of earning livelihood amongst men results in alleviated blood pressure, which may lead to other health complications (Azad, 2015 and Upadhayay, 2017). Champawat district has the second largest percentage of illiterate population in Kumaun region, which results in poor family planning thus deteriorating the status of both mother and child resulting in nutritional deficiency and problems like anemia. Susceptibility to diabetes in Asian population has been established by various studies, and in Uttarakhand, percentage of men prone to diabetes is found to be higher (Rhee, 2015). In Champawat district lack medical facilities prevents primary diagnosis of diabetes thus resulting in large population of men suffering from high blood sugar levels (Azad, 2016).

Conclusion

Kumaun division fares far much better in terms of adult health status than Garhwal. High rates of literacy and general awareness amongst its people is the driving force for the healthy population in the region, though the presence of NCDs cannot be ignored but with slight changes and adaptations, these can be stabilized. Out of all districts in Kumaun region, Champawat has the least proportion of population suffering from NCDs while Bageshwar requires immediate action and implementation of different programmes to aware people of health hazards. Likewise, in Garhwal, division Pauri-Garhwal has the least proportion of NCD population and Maximum distribution was centered on Haridwar and Dehradun district. Garhwal division requires more attention in terms of health improvement.

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