Original Article

NCD Risk Factors in Different Administrative Divisions of West Bengal: An Insight Analysis from National Family Health Survey-5 Report

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Introduction : This study was designed to find out the group mean prevalence of NCD risk factors in different administrative divisions of West Bengal (WB) and to explore the probable reasons of these differences in different indigenous habitat wise groups of districts of West Bengal.

Methods : This descriptive study was conducted on available secondary data from National Family Health Survey-5 (NFHS-5) regarding NCD risk factors. For this study, WB's districts were divided into five administrative divisions namely Presidency, Medinipur, Burdwan, Malda and Jalpaiguri. Again WB State divided into three groups namely Jangalmahal (forest region), Pahar (Himalayan Hilly region) and "Rest of West Bengal" (ROW) on the basis of habitat of major indigenous people. Data are analyzed by Microsoft excel software in percentage and group mean.

Results : Presidency (M: 20.6% *versus* F: 21.9%) with Medinipur (M: 20.3% *versus* F: 19%) divisions and Jangalmahal group of districts (M: 22.1% *versus* F: 16.5%) have higher group mean prevalence of high blood sugar in West Bengal. High group mean prevalence of high blood pressure was observed in Pahar (M: 26.6% *versus* F: 25.2%) group of districts and Jalpaiguri (M: 24.7% *versus* F:24%) division. The group mean prevalence of alcohol intake is very high in Jalpaiguri division (M: 25.2% *versus* F: 3%). The group mean prevalence of obesity (women aged 15-49 years) is increased from the last NFHS -4 survey.

Conclusion : The group mean prevalence of alcohol intake and high blood pressure are very high in Pahar. The tobacco use related habit is comparatively high in Jangalmahal and Pahar group of districts. The group mean prevalence of high blood sugar is comparatively high in Jangalmahal and Presidency division areas.

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Key words **: Group mean prevalence, NCD risk factors, Administrative divisions of West Bengal, NFHS-5.**

Non-communicable Diseases (NCDs) contribute to around 38 million (68%) of all the deaths globally and to about 5.87 million (60%) of all deaths in India. Four NCDs (cardiovascular diseases, chronic respiratory disease, cancers and diabetes) are contributing to about 82% of all NCD deaths[1]. Current study recommended, if comprehensive measures (eradicating the common risk factors, mainly tobacco use, unhealthy diets, physical inactivity, and the harmful use of alcohol)are implemented properly then 80% NCDs (Heart diseases, Stroke, Hypertension and Type 2 Diabetes, and over a third of Cancers) related premature deaths can be minimized[2]. To deal with this problem the Government of India has launched the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases and Stroke (NPCDCS) in 2010[3]. This initiative has to be implemented in full swing across Pan-India with proper policy that addresses all components of the programme[4]. It is also noticed that the NCD related health literacy is very low in India[5, 6] as well as in West Bengal[7].

Editor's Comment :

- The burden of alcohol intake and high blood pressure are very high in Pahar group of districts (hilly tribal zone of West Bengal).
- The tobacco use related habit is comparatively high in Jangalmahal and Pahar group of districts (tribal area predominantly).
- The group mean prevalence of high blood sugar is comparatively high in Jangalamahal (rural tribal area) and Presidency (urban predominant) division area.
- The female population has a higher burden of overweight and higher WHR especially in urban areas of West Bengal.

In National Family Health Survey-5 (NFHS-5) (2019-2020) an effort was employed to measure the district level health status of Indian population by the Government of India (GoI)[8]. With this available district level data of NCD risk factors, this study is designed to find out the group mean prevalence (GMP) of NCD risk factors in different administrative division of WB[9] and to explore the difference of GMP of NCD risk factors in different indigenous habitat wise group of districts of West Bengal (WB). This effort has clearly demonstrated the difference of prevalence of NCD risk

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factors in urban vs rural, tribal area vs Non-tribal area, plan land *versus* hilly area and male vs female population.

Materials and Methods

The secondary data available from the NFHS-5 (2019–2020) was analyzed at district level focusing on WB. The required Information of WB was gathered from 18,187 households, 21,408 women, and 3,021 men during 21 June, 2019 to 8 November, 2019 by Indian Institute of Health Management Research (IIHMR)[8].

Operational definition of risk factors[8]

High blood sugar — Random blood sugar >140 mg/dl or taking medicine to control blood sugar level

High Blood Pressure — Elevated blood pressure (Systolic e"140 mm of Hg and/or Diastolic ≥90 mm of Hg) or taking medicine to control blood pressure

Tobacco consumption — Men or Women age 15 years and above who use any kind of tobacco

Alcohol consumption — Men or Women age 15 years and above who consume alcohol

Overweight women: Women who are overweight or obese (BMI ≥25.0 kg/m2)

Women with high waist to hip ratio (WHR): Women who have high risk waist-to-hip ratio (≥0.85)

Group mean prevalence (GMP): The group mean prevalence is the mean prevalence of any variables of a group of districts. The prevalence of different risk factors of different districts were considered as "unit of data".

Selection of districts in West Bengal

NFHS-5 survey conducted in 2019-2020 included 19 districts of WB In the NFHS-5 portal, there is no data available regarding three newly developed districts (Jhargram, Kalimpong and Alipurduar) of WB. The WB state is divided into five administrative divisions namely Presidency, Medinipur, Burdwan, Malda and Jalpaiguri (Table 1-A)[9]. For the purpose of this article the WB State has been further divided into three groups Jangalmahal (forest region), Pahar (Himalayan Hilly region) and "Rest of West Bengal" (ROW) on the basis of habitat of major indigenous people (Table 1-B). The Jangalmahal[10] and Pahar[11] group of districts have a comparatively large number of tribal populations.

Ethical clearance : No ethical clearance is necessary to analyze the secondary data which are publicly available. The required data was retrieved on

Table 1 — *List of districts of West Bengal under Administrative divisions and group of Districts on the basis of habitat of major indigenous people*

(A) Administrative divisions of West Bengal

Presidency	Medinipur	Burdwan	Malda	Jalpaiguri
Majority of population stay in Urban area (flat land)	Majority of population stay in rural area and majority are from tribal (Austro-Asiatic) community (flat land) (Naxalite area)	Majority of population stay in rural area and they are normally non-tribal community (flat land)	Majority of population stay in rural area and they are normally non-tribal community (flat land sharing Bangladesh border)	Majority of population stay inrural area and they are normally tribal (Tibeto-Burman and Austro-Asiatic) and Nepali community (flat land but some areas are high altitude area)
Kolkata Howrah 24 Paragana (N) 24 Paragana (S) Nadia	Medinipur (E) Medinipur (W) Purulia Bankura Jhargram	Burdwan (E) Burdwan (W) Birbhum Hooghly	Malda Murshidabad Dinajpur (N) Dinajpur (S)	Jalpaiguri Darjeeling Coochbihar Alipurdwar Kalimpong

(B) Group of Districts on the basis of habitat of major indigenous people in West Bengal

Jangalmahal	Pahar	Rest of West Bengal (ROW)	
Majority of population stay in rural flat area and majority are from tribal (austro-asiatic) community (partly Naxalite area)	Mainly multicultural community however significant of population stay in rural hilly area and they are normally Nepali and Tibeto-Burman tribal community –Lepcha, Bhutia, Tamang, Limbo, Sherpa etc (partly Gorkhaland movement area)	Majority of population stay in urban and rural area (flat land). Majority populations are non-tribal.	
Medinipur (W) Purulia Bankura Jhargram	Jalpaiguri Darjeeling Kalimpong	Medinapur (E) Kolkata Howrah 24 Paragana (N) 24 Paragana (S) Nadia Burdwan (E) Burdwan (W)	Malda Murshidabad Dinajpur (N) Dinajpur (S) Coochbihar Alipurdwar Birbhum Hooghly

27th December, 2020 form National Family Health Survey website[8].

Statistical Analysis : The descriptive statistics were computed by using Microsoft excel software in percentage and group mean.

Results

Results are divided into five parts:

(A) Distribution of group mean prevalence of high blood sugar of different zones

(B) Distribution of group mean prevalence of high blood pressure of different zones

(C) Distribution of group mean prevalence of tobacco use of different zones

(D) Distribution of group mean prevalence of alcohol use of different zones

(E) Changing group mean prevalence of overweight among women age 15-49 years in NFHS-4 and NFHS-5of different zones

(F) Distribution of high Waist to Hip ratio (WHR) among women age 15-49 years of different zones

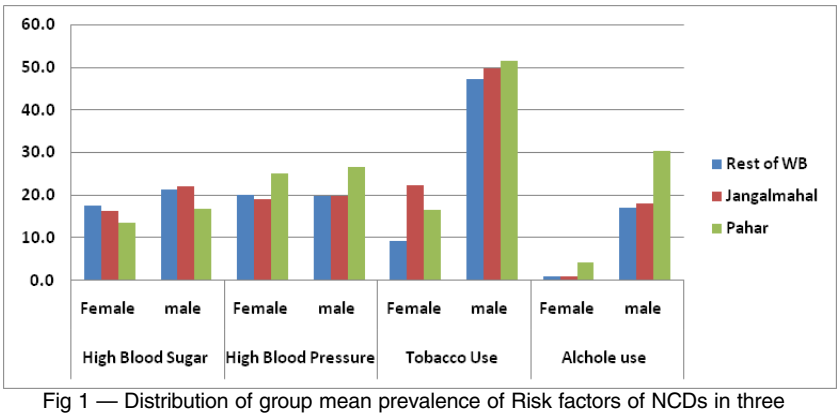

Fig 1 — Distribution of group mean prevalence of Risk factors of NCDs in three demarcated areas of West Bengal (data presented in percentage)

(A) Distribution of high blood sugar :-

Table 2 described the administrative division-wise district level analysis of group mean prevalence of high blood sugar in WB. The table denotes that the high blood sugar patients are more among male population of Medinipur division (22.6%). According to Indigenous habitat -wise district level analysis, it is found that, group mean prevalence of high blood sugar is high amongst the Jangalmahal (male: 22.1% and female: 16.5%) and ROW (Male: 21.5% and Female: 17.6%). (Table 4, Fig 1)

(B) Distribution of high blood pressure :-

The higher group mean prevalence of high blood pressure was notified in the Jalpaiguri division (male: 24.7% and female: 24.0%) in administrative division-wise district level analysis in WB (Table 2). Almost ¼th adult populations are affected with high blood pressure. Jangalmahal and ROW groups of districts have less group mean prevalence of high blood pressure and it is almost 19-20 % among the adult population. In Indigenous habitat -wise district level analysis of WB found, Pahar (Male: 26.6% and Female: 25.2%) area has a very high group mean prevalence of high blood pressure. The group mean prevalence of high blood pressure is more among male population than the female population in all groups.

(C) Distribution of tobacco use :-

Male adult population outnumbered the female population regarding the use of tobacco in any form. Almost ½ of the whole adult male population are using tobacco in WB. The group mean prevalence of tobacco use among adult females is quite higher among Medinipur (20%) and Jalpaiguri (18.6%) divisions' area than other divisions of WB.

(D) Distribution of alcohol use :-

Male adult population outnumbered the female population regarding the prevalence of intake of alcohol. Almost ¼th of the whole adult male population are using alcohol in WB. The group mean prevalence of alcohol intake is very high among Jalpaiguri (Male: 25% and Female: 3%) divisions than other four administrative divisions in WB. However, Table 4 and Fig 1 clearly denoted that prevalence of using alcohol in the Pahar group of districts (Male: 30.6% and Female: 4.3%) is very higher than "ROW" and Jangalmahal group of districts.

Table 2 — *Distribution of group mean prevalence of high blood sugar, high blood pressure, tobacco use and alcohol use in five administrative divisions of West Bengal*

Name of Division	High Blood Sugar (%)		High Blood Pressure (%)		Tobacco Use (%)		Alcohol use (%)	
	Female	Male	Female	Male	Female	Male	Female	Male
Presidency	18.8	22.1	21.9	20.6	6.4	46.9	0.6	17.3
Medinipur	17.7	22.6	19.0	20.3	20.0	47.4	1.3	17.4
Burdwan	17.2	22.1	20.1	20.0	9.5	48.5	1.3	19.5
Malda	16.6	20.1	18.0	18.5	9.1	46.3	1.3	16.1
Jalpaiguri	13.5	17.5	24.0	24.7	18.6	53.1	3.0	25.2

(E) Changing GMP of overweight among women age 15-49 years in NFHS-4 and NFHS-5

Table 3 and Fig 2 denote that the group mean prevalence of overweight among women aged 15-49 years has increased from NFHS-4 to NFHS-5 in all administrative divisions of WB state. In WB, the presidency division and Medinipur division have the highest and lowest group mean

Table 3 — *Distribution of group mean prevalence of Overweight and High WHR women in administrative divisions of West Bengal*

Name of Division	Obesity (%)		High Waist to Hip ratio (%)
	NFHS-5	NFHS -4	NFHS-5
Presidency	25.6	28.6	82.0
Medinipur	17.3	12.7	59.6
Burdwan	23.1	20.1	69.0
Malda	20.5	12.5	75.9
Jalpaiguri	20.5	16.0	77.7

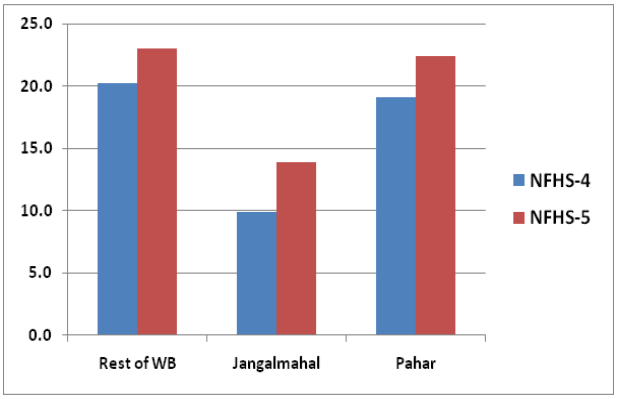

Fig 2 — Distribution of changing group mean prevalence of Overweight among women (age 15-49 years) in three demarcated areas of West Bengal (NFHS-4 and NFHS-5) (data presented in percentage)

prevalence of overweight women aged 15-49 years respectively (Table 3). In Indigenous habitat -wise district level analysis of WB found, Pahar and "ROW" group of districts have almost 20% of group mean prevalence of women (age 15-49 years) with overweight. In the Jangalmahal group of districts, this group mean prevalence is only 10%.

(F) Distribution of high WHR among women age 15-49 years

The group mean prevalence of WHR is very high among women aged 15-49 years in all administrative divisions of WB. Table 5 denotes that the presidency division has the highest group mean prevalence of women with high WHR among all administrative divisions of WB. However the Indigenous habitat -wise district level analysis of WB found, Pahar and the "ROW" group of districts have an almost high

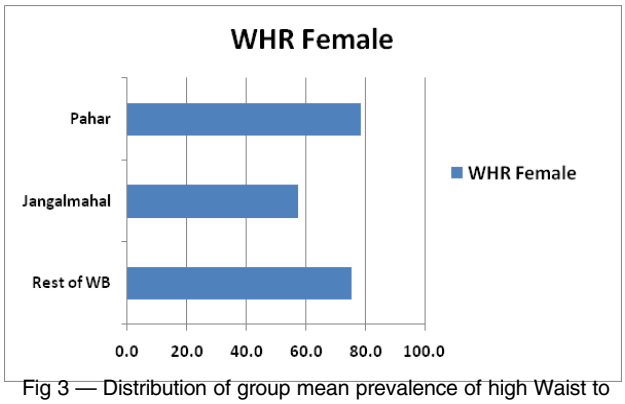

Fig 3 — Distribution of group mean prevalence of high Waist to hip ratio (WHR) among women aged 15-49 years in three demarcated areas of West Bengal (data presented in percentage)

prevalence of women with high WHR and it is more than 77%. But the Jangalmahal group of districts' group mean prevalence of women with high WHR is only 57% (Fig 3).

Discussion

The analysis is attempted to estimate the group mean prevalence of NCD risk factors in different administrative divisions of WB and to explore the difference of group mean prevalence of NCD risk factors in different indigenous habitat wise groups of districts of WB based on the data available from NFHS-5.

The NFHS-5 report documented that WB's prevalence of high blood sugar among adult male and females are 23.1% and 17.5% respectively[12]. In NFHS-4 report, the prevalence of high blood sugar were 17.3% and 10.9% among male and female respectively[13]. It is clearly visible that prevalence of high blood sugar in increasing tread in West Bengal. The male population is more affected with diabetes mellitus than the female population in WB. In comparison between urban and rural adult populations, we observed a slightly different pattern of prevalence[12]. Among adult female population prevalence of high blood sugar is 19.4% and 16.5 % in urban and rural areas respectively. However the prevalence of high blood sugar among the adult male population is 20.4% and 21.3% in urban and rural areas respectively[12]. Urban female population burden for diabetes mellitus is higher in comparison to rural adult female population. But the figure of prevalence of high blood sugar is almost the same in urban and rural adult male populations.

Moreover, the analysis regarding group mean prevalence of high blood sugar revealed that the Presidency

Table 4 — *Distribution of group mean prevalence of NCD risk factors in three demarcated areas of West Bengal*

Name of Area	High Blood Sugar (%)		High Blood Pressure (%)		Tobacco Use (%)		Alcohol use (%)	
	Female	Male	Female	Male	Female	Male	Female	Male
Pahar	13.5	16.9	25.2	26.6	16.7	51.6	4.3	30.
Jangalmahal	16.5	22.1	19.3	19.9	22.3	49.8	1.1	18.2
Rest of WB	17.6	21.5	20.1	19.9	9.4	47.	1.0	17.2

division (Male: 22.1%, Female: 18.8%) has a higher burden for diabetes mellitus than any other administrative division in WB. The Presidency division is a predominantly urban region of the state with high GDP. The same type of picture is also observed when the analysis is performed on the basis of area of Indigenous habitat. The tribal predominant areas like Pahar and Jangalmahal have less burden of prevalence of high blood sugar than "ROW" (Male: 21.5%, Female: 17.6%). Sikkim, a neighbor state of WB with 30% tribal population, has less prevalence (Male: 15.7%, Female: 12.2%) of high blood sugar than the whole WB among adults as per this survey[12]. However in NPCDCS report-2011, Sikkim was reported with the highest percentage of high blood sugar (13.67%) and high blood pressure (18.16%) among all states in India[14]. It is reflected that Sikkim and WB's prevalence of high blood sugar is in increasing trend. A significantly higher group means prevalence of high blood sugar is also observed among male population of Medinipur (22.6%) division which is predominantly a nonurban and partly tribal zone of WB. It reflects a rising burden of high blood sugar in rural as well as tribal areas of WB. It has been documented in West Bengal[15] that, in hospital mortality due to Myocardial Infarction (MI) was higher in IFG (impaired fasting glucose) patients (18%) which is near about same in proportion with diabetes patients (20%) in compression of euglycemic patients (4%). This shows that the earliest attention is required to prevent cardiac mortality by prevention of IFG and diabetes.

Regarding high blood pressure, NFHS-5 survey reported quite a higher burden of high blood pressure in WB (male: 20.1%, female: 20.5%)[12]. The prevalence of high blood pressure on the basis of gender difference is not observed in WB. In WB, urban population (male: 23.3%, female: 21.5%) has more prevalence of high blood pressure than rural population (Male: 19%, Female: 19.9%). In Indigenous habitat -wise district level analysis revealed the people of "Pahar" group of districts have more burden of high group mean prevalence of high blood pressure than Janagalmahal and "ROW". The people of Pahar group of districts have different cultural practices, traditional dietary habits, genetic architecture and language (Tibeto-Burman) than other parts of WB. However, the group mean prevalence of high blood pressure is almost same in Medinipur, Burdwan and Presidency administrative divisions among male adults which are also quite high and almost same with state average. The prevalence of high blood pressure is markedly increased with high altitude in this area as the data present in this survey report. In comparison of NFHS-4 data, West Bengal is in increasing trends of prevalence of high blood pressure[12,13,16].

NFHS-5 survey reported very basic prevalence related information about harmful use of products like tobacco and alcohol which are major behavioral risk factors for NCDs. The prevalence of tobacco use among male adults in WB (Male: 48.1%, Female: 10.8%) is fairly higher in comparison to the female population[12]. Again it is observed that the prevalence of use of tobacco is also high in rural area in WB (rural male: 49.9%, rural female: 12.3% *versus* urban Male: 44.7%, urban Female: 8%) than urban area[12]. The number of adult male tobacco users is almost four times higher than female adult tobacco users. In division wise district level analysis in WB revealed that the group mean prevalence of adult female tobacco users is very high in Medinipur (20%) and Jalpaiguri (18.6%) division like tribal predominant areas. In Indigenous habitat -wise district level analysis, it is clearly observed that the group mean prevalence of adult female tobacco users in Janagalmahal and Pahar are almost double than "ROW". Same type of high prevalence of tobacco use was noticed in tribal population[17] and sub-Himalayan area[18] of WB in other studies. Especially smokeless tobaccos in the form of KHAINI and DOKTA and Bidi like smoking tobacco are widely practiced in rural populations of WB.

Regarding the alcohol intake habit, NFHS-5 survey reported higher prevalence of alcohol intake person among male population in WB (male: 18.1%, female: 1.1%)[12]. The group mean prevalence of alcohol intake habit is almost same in Jangalamahal (male: 18.2%, female: 1%) and "ROW" (Male: 17.2%, Female: 1%) group of districts which are quite similar with the state figures. The studies from Jhargram[19] and West Medinipur[20] documented a very high prevalence of alcohol intake in tribal populations in West Bengal. The Pahar group of districts have a very high group mean prevalence of male alcohol intake habits (Male:30.6%, Female: 4.3%), which is quite similar to neighboring state Sikkim as both areas share common cultural, social and behavioral habits. There is no social stigma of alcohol intake in this high altitude Himalayan society and this habit is very much socially acceptable. This type of high prevalence is also observed in one sub-Himalayan study in WB[17]. However in comparison of NFHS-4 data, both states are in decreasing trends of prevalence of alcohol use[12,13,16].

According to the NFHS-5 and NFHS-4 report, WB's prevalence of overweight is increasing treads". Almost 1/5th adult Bengalis are overweight, which is the leading

risk factor of diabetes, hypertension, dislipidemia, stroke, depression and heart diseases. The burden of prevalence of overweight is higher in the urban population than the rural population in WB. The division wise district level analysis of WB revealed that urban dominated Presidency division (25.6%) has a major burden of overweight in women (aged 15-49 years) which is almost double than Jangalmahal (13.9%) group of districts (Austro-Asiatic prevalent tribal area). Same observation is also noticed in a comparison study in WB[21]. However the presidency division area's group mean prevalence of obesity among women (aged 15-49 years) is improved than NFHS-4 survey report.

WHR is an independent risk factor for Metabolic Syndrome and diabetes. Almost 2/3rd female and more than 50% male adult populations have high WHR[12]. The presidency (82%) and Medinipur (59%) division have the highest and lowest group mean prevalence of WHR among women (aged 15-49 years) than any other administrative divisions respectively. The Jangalamahal (57.4%) has comparatively less group mean prevalence of high WHR among women (aged 15-49 years). This finding may be due to high physical activity level, genetic cause and dietary habit of this area[22].

Conclusion

As a gross, rural population has competitively very high prevalence of tobacco and alcohol intake habits. The female population has a high burden of overweight and WHR related problems especially in urban areas. The male and female have almost the same burden of group mean prevalence of high blood pressure in WB. The urban adult population has a comparatively high burden of overweight and high blood sugar. The group mean prevalence of alcohol intake and high blood pressure are very high in Pahar (hilly tribal zone of WB). The tobacco use related habit is comparatively high in Jangalmahal and Pahar group of districts (tribal area). The group mean prevalence of high blood sugar is comparatively high in Jangalamhal (rural tribal area) and Presidency (urban predominant) division area. Urgent and focused attention towards these risk factors is required for planning and implementation of targeted interventions in view of effective NCD control in the WB.

Limitation of the study : There are two major limitations of this review study. Firstly, "group mean prevalence" has been presented in this study where prevalence of different risk factors of different districts were considered as "unit of data". The "unit of observation" is presented in the "group of districts'' level. The "group mean prevalence" is not directly similar with the terminology "Prevalence" as this analysis has not been computed with the data collected from individual person sample data. Secondly, the Standard Deviation (SD) has not been evaluated as numbers of districts are very small in each group of districts to provide any significant conclusion

Way forward to deal with this crisis :

(1) Community level awareness activity to improve NCD related health literacy in urban and rural areas and special focus should be given on locally prevalent unhealthy modifiable risk factors.

(2) Community level screening on NCDs and early treatment to prevent complications

(3) Free annual health check up for all 30+ aged people.

(4) Special focus should be given on behavioral risk factor modification as primordial prevention approach.

(5) Affordable, available and accessible comprehensive diseases management with assured sustainable medicine supply and required investigations as per NPCDCS guidelines.

(6) Supportive and periodical monitoring of NPCDCS and Ayushman Bharat programme.

(7) Development and improvement of health care infrastructure to deal with the future burden of NCDs and reduce the "out-pocket expenditure".

(8) Periodical training of health care staff on updated guidelines and management

(9) Multi-stakeholders involvement and political willingness

(10) Involvement of AYUSH system of medicine in an integrative approach with updated evidences and mainstreaming the AYUSH manpower in preventive, promotive, curative and rehabilitative NCDs care.

(11) Increase taxation on tobacco and alcohol related products.

(12) Development and implementation of Information technology or HMIS for proper follow up, health awareness and referral (with reverse referral) system.

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