ORIGINAL ARTICLE

Basic Necessities and Health Indicators of Tribal Population of India: A Secondary Analysis from National Family Health Survey-IV

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ABSTRACT

Background: Inequalities within tribal communities across India remain poorly understood. Accessibility to resources or health care is observed as a principle of primary health care. The accessibility factor has been least studied among the indigenous groups of country. **Objective:** To determine the correlation between accessibility of services and health indicators among tribal population of India using the indicators from National Family Health Survey report 2015-16. **Methods:** An ecological correlation using district reports of National Health and Family Survey-IV (2015-16) was conducted. The reports of tribal districts were used to select and analyze core health and nutrition indicators (dependent variables). Literacy, electricity, altitude, improved drinking water and sanitation facility were taken as accessibility to necessary indicators from the reports (independent variables). **Results:** Prevalence of diarrhea (r: -0.18, p: 0.80) and symptoms of acute respiratory illnesses (r:0.30, p:0.003) among children decreased with improved drinking water and sanitation facilities. Better literacy, water accessibility, electricity and sanitation were negatively correlated with prevalence of anemia and underweight among adults, however the prevalence of overweight, high blood sugar and high blood pressure increased. The increase in altitude was negatively correlated with nutritional indicators viz., prevalence of stunting (r: -0.34, p<0.001), wasting (r: -0.33, p<0.001) and underweight (r: -0.41, p<0.001) among children. **Conclusion:** The tribal districts with better accessibility to basic necessities fared better in terms of core health and nutrition indicators.

KEYWORDS

Bare Necessities, Maternal And Child Health, Tribes, Altitude, NFHS-4, India

INTRODUCTION

There are 104 million indigenous people in India (8.6% of total population) which makes India the second largest in terms of the absolute concentration of indigenous peoples. Majority of the Scheduled tribe population live in rural areas in forest and hilly geographical areas. They are usually hunter-gatherers, shifting cultivators, pastoralists, and artisans.

Ministry of Tribal Affairs, Government of India (GOI) in their report on tribes mention that only 10.7% of tribal population have access to tap water and around 75% defecate in open. Only 51% are literate, although this has increased in a decade. The tribal community lags behind the national average on several health indicators, with women and children being the most vulnerable.(1,2) The concept that health depends broadly on two sets of factors- genetic and environmental factors needs a modification. In developing countries like India, where traditional life style still persists, risks of illness and health are connected with behavioural and socio-cultural practices also. This interplay between genetic, environment and behaviour

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practices need can be indirectly studied through the health indicators and outcomes.

The tribal people have almost same health problems, similar health needs as general population and hence the uniform national pattern of rural healthcare would be applicable to them as well, albeit with some alteration in population. The accessibility to health care among tribal population is also one of the factors affecting their health. It is a general notion that most tribal people live in remote rural settlements in hilly, forest or desert areas where illiteracy, unfavorable physical environments, malnutrition, inadequate access to safe water, and lack of personal hygiene and sanitation make them more vulnerable to disease.(3) If a population's basic necessity is not accessible or available health becomes their second priority.

A number of studies in different countries have studied the interplay of different determinants of health but very few studies have tried to explore the effect of accessibility to basic services on the nutritional and core health indicators of tribal population. Using the National Family Health survey 2015-16 (NFHS-4)(4) district reports of various districts where tribal population reside the correlation between various health and accessibility indicators have been studied.

OBJECTIVES

To determine the correlation between accessibility of services and health indicators among tribal population of India using the indicators from National Family Health Survey report 2015-16.

MATERIAL & METHODS

The ecological correlation was conducted as a secondary analysis using reports of National Health and Family Survey-IV (2015-16) between January and June 2020. The district wise NFHS reports are available on public domain.(4) The list of tribal districts across the country was sought from the annual report of Ministry of Tribal Affairs.(2) A total of 95 districts were included in analysis. Further the altitude of every tribal district was noted as available from the websites of district administration of each district. The variables selected from NFHS report were grouped as follows:

Accessibility to necessities indicators: Altitude, Women (15-49 years) who are literate, men (15-49 years) who are literate, literacy rate (male and female), households with electricity, households with improved drinking water source, households with improved sanitation facility, altitude

Core health indicators: Children age 12-23 months fully immunized (BCG, measles, and 3 doses each of polio and DPT), Prevalence of diarrhoea (reported) in the last 2 weeks preceding the survey, Prevalence of symptoms of acute respiratory infection (ARI) in the last 2 weeks preceding the survey, All women age 15-49 years who are anemic, Men age 15-49 years who are anaemic, blood sugar level high >140 mg/dl (male and female), Blood pressure among adults 15-49 years >140/90 mm of Hg (male and female)

Nutritional indicators: Children under 5 years who are underweight (weight-for-age), wasted (weight for height) and stunted (height for age), Women and Men whose Body Mass Index (BMI) is below normal (BMI < 18.5 kg/m2), Women and Men who are overweight or obese (BMI ≥ 25.0 kg/m2).

Operational definition

Improved drinking water sources: Households which include piped water, public taps, standpipes, tube wells, boreholes, protected dug wells and springs, rainwater, and community reverse osmosis (RO) plants.

Improved sanitation facilities: Include any non-shared toilet of the following types: flush/pour flush toilets to piped sewer systems, septic tanks, and pit latrines; ventilated improved pit /biogas latrines; pit latrines with slabs; and twin pit/composting toilets.

Literate: Respondents who have completed standard six or higher were assumed to be literate. All other respondents were given a sentence to read, and they were considered to be literate if they could read all or part of the sentence.

Altitude: For the purpose of study, the altitude of the district was divided in two categories. Those altitudes equal to and higher than 2134 meters (7000 feet) were labelled as high-altitude tribal districts and the districts below 2134 meters were labelled as low altitude tribal districts.

Fully immunized children of age group 12-23 months: Children age 12-23 months who received specific vaccines at any time before the survey (according to a vaccination card or the mother's report). To have received all basic vaccinations, a child must receive at least: one dose of BCG vaccine, which protects against tuberculosis, three doses of DPT vaccine, which protects against diphtheria, pertussis (whooping

cough), and tetanus, three doses of polio vaccine or one dose of measles vaccine

Anthropometry: Height and weight were measured for children age 0-59 months, women age 15-49, and (in the state module subsample of households only) men age 15-54. The Seca 874 digital scale was used to measure the weight of children and adults. The height of adults and children age 24-59 months was measured with the Seca 213 stadiometer. The Seca 417 infantometer was used to measure the recumbent length of children under two years or less than 85 cm.

Stunting (assessed via height-for-age): Height-for-age is a measure of linear growth retardation and cumulative growth deficits. Children whose height-for-age Z-score is below minus two standard deviations (-2 SD) from the median of the reference population are considered short for their age (stunted), or chronically undernourished.

Wasting (assessed via weight-for-height): Weight-for-height index measures body mass in relation to body height or length and describes current nutritional status. Children whose Z-score is below minus two standard deviations (-2 SD) from the median of the reference population are considered thin (wasted), or acutely undernourished.

Underweight (assessed via weight-for-age): Weight-for-age a composite index of height-for-age and weight-for-height takes into account both acute and chronic undernutrition. Children whose weight-for-age Z-score is below minus two standard deviations (-2 SD) from the median of the reference population are classified as underweight.

Body mass index of adults: BMI is calculated by dividing weight in kilograms by height in metres squared (kg/m2). For women age 15-49 who are not pregnant and who have not had a birth in the two months before the survey and men age 15-49; BMI below 18.5 kg/m2 was labelled underweight, between 25 kg/m2 and 29.9 kg/m2 were labelled as overweight and above 30 kg/m2 as obese.

ARI symptoms: Children under age five years with symptoms of ARI in the two weeks before the survey. ARI symptoms consist of cough accompanied by (1) short, rapid breathing that is chest related, and/or (2) difficult breathing that is chest related.

Anemia: Blood specimens for anaemia testing were collected by health investigators from eligible women age 15-49 and men age 15-54., and children age 6-59 months. Haemoglobin analysis was conducted on-site with a battery-operated portable HemoCue Hb 201+ analyser. Respondents were labelled as anaemic when haemoglobin level was below 12 g/dl for women who were not pregnant, and men with Hb below 13 g/dl.

Blood pressure measurement: Blood pressure was measured for eligible women age 15-49 and eligible men age 15-54, using an Omron Blood Pressure Monitor to determine the prevalence of hypertension. Blood pressure measurements for each respondent were taken three times with an interval of five minutes between readings. Woman or man between 15-49 years age group is classified as having hypertension if he/she has a systolic blood pressure level greater than or equal to 140 mmHg, or a diastolic blood pressure greater than or equal to 90 mmHg, or he/she is currently taking antihypertensive medication to lower his/her blood pressure.

Blood glucose testing: Random blood glucose was measured using a finger-stick blood specimen for eligible women age 15-49 and eligible men age 15-54 using the FreeStyle Optium H glucometer with glucose test strips. An individual is classified as having high blood glucose if he/she has a random blood glucose level of 141-160 mg/dl and very high blood glucose if he/she has a random blood glucose level of 161 mg/dl or higher.

Data collection: The district wise reports of NFHS -4 of selected tribal districts was accessed for the 95 districts. Further the above-mentioned indicators data was entered in Microsoft excel sheet along with the altitude of each district.

Statistical analysis: Accessibility to basic needs indictors were considered as independent variable. Core health and nutritional indicators were considered as dependent variables. The correlation between mean value of accessibility variables and core health and nutritional indicators are presented using Pearson's correlation. The statistical analysis was done using SPSS version 21 (IBM SPSS).

RESULTS

Overall better literacy (both female (r:0.12, p:0.26) and male (r:0.23, p:0.03)) is positively correlated with proportion of fully immunized 12-23 months children. Increasing literacy rate is correlated with decrease in the prevalence of stunting, wasting, underweight and diarrhea among children. Electricity in households

showed a significant moderate to strong negative correlation with prevalence of wasting, stunting and underweight among children (r: -0.54, -0.39, -0.56, p<0.001 respectively). Improved drinking water and sanitation facilities are correlated with decrease in prevalence of diarrhea (r:-0.18, p: 0.80) and symptoms of ARI (r:0.30, p:0.003). A significant decrease in prevalence of poor nutritional status of children under five-year age was observed with improved sanitation facilities among households. The increase in altitude was correlated with increasing immunization, decrease in prevalence of stunting, wasting, underweight and diarrhea among children. (Table 1)

TABLE 1: CORRELATION BETWEEN ACCESSIBILITY TO BASIC NECESSITY AND CORE HEALTH INDICATORS

	Core health indicators (correlation coefficient, p value)								
Accessibility to necessities indicators	Fully immunized children (12-23 months)	Prevalence of Diarrhea among children	Prevalence of ARI symptom among children	Prevalence of Anemic adult Female	Prevalence of Anemic adult Male	Prevalence of Blood sugar >140 mg/dl (adult female)	Prevalence of Blood sugar >140 mg/dl (adult male)	Prevalence of Blood pressure >140/90 (female)	Prevalence of Blood pressure>140/90 (male)
Altitude	0.11, 0.29	-0.06, 0.54	0.03, 0.75	0.06, 0.53	0.15, 0.14	-0.14, 0.18	-0.13, 0.21	0.03, 0.79	0.17, 0.10
Adult Literate females	0.12, 0.26	-0.15, 0.15	0.03, 0.76	-0.58, <0.001	-0.47, <0.001	0.39, <0.001	0.29, 0.004	0.31, 0.003	0.37, <0.001
Adult Literate males	0.23, 0.03	-0.12, 0.25	-0.06, 0.57	-0.46, <0.001	-0.44, <0.001	0.27, 0.01	0.19, 0.07	0.09, 0.35	0.22, 0.03
Households with electricity	0.08, 0.43	-0.07, 0.47	0.002, 0.98	-0.07, 0.46	-0.12, 0.25	0.20, 0.05	0.23, 0.02	-0.13, 0.22	0.08, 0.43
Households with improved drinking water	0.21, 0.04	-0.18, 0.08	-0.30, 0.003	-0.70, <0.001	-0.59, <0.001	0.51, <0.001	0.37, <0.001	0.36, <0.001	0.41, <0.001
Households with improved sanitation	-0.15, 0.14	-0.34, 0.001	-0.18, 0.07	-0.35, <0.001	-0.29, 0.004	0.23, 0.02	0.17, 0.09	0.11, 0.28	0.22, 0.03

Increase in altitude is positively correlated with higher BMI of adults (males; r:0.20, p:0.05; females: r: 0.19, p: 0.07) but negatively correlated with prevalence of males and females with blood sugar level> 140 mg/dl (males; r:0.14, p:0.18; females: r: 0.13, p: 0.21). There was a weak positive correlation of altitude and prevalence of high blood pressure among adults (males; r:0.03, p:0.79; females: r: 0.17, p: 0.10). Higher literacy (both males and females) had significant strong negative correlation with prevalence of underweight and significant positive correlation with prevalence of overweight and obesity among adults (both males and females). (Table 2)

TABLE 2: CORRELATION BETWEEN ACCESSIBILITY TO BASIC NECESSITY INDICATORS AND NUTRITIONAL INDICATORS

	Nutritional indicators (correlation coefficient, p value)						
Accessibility to necessities indicators	Stunted children	Wasted children	Underweight children	Underweight adult female	Underweight adult male	Overweight-obese adult female	Overweight-obese adult male
Altitude	-0.34, 0.001	-0.33, 0.001	-0.41, <0.001	-0.42, 0.001	-0.30, 0.003	0.20, 0.05	0.19, 0.07
Adult Literate females	-0.56, <0.001	-0.57, <0.001	-0.73, <0.001	-0.73, <0.001	-0.65, <0.001	0.53, <0.001	0.44, <0.001
Adult Literate males	-0.51, <0.001	-0.44, <0.001	-0.57, <0.001	-0.58, <0.001	-0.53, <0.001	0.55, <0.001	0.51, <0.001

Households with electricity	-0.54, <0.001	-0.39, <0.001	-0.56, <0.001	0.07, 0.52	-0.03, 0.80	0.22, 0.03	0.18, 0.08
Households with improved drinking water	0.08, 0.47	-0.06, 0.54	0.001, 0.99	-0.69, <0.001	-0.64, <0.001	0.53, <0.001	0.34, <0.001
Households with improved sanitation	-0.49, <0.001	-0.66, <0.001	-0.76, <0.001	-0.49, <0.001	-0.42, <0.001	0.56, <0.001	0.40, <0.001

DISCUSSION

The current analysis tried to establish an ecological correlation between the accessibility indicators and health indicators obtained from NFHS-4 reports. The core health indicators of tribal districts like adult underweight and anemia prevalence showed negative relation with better accessibility to electricity, water and sanitation. Accessibility to water and sanitation were correlated with decreased prevalence of diarrhea and acute respiratory symptoms among children. However, the lifestyle diseases and their risk factor prevalence were increasing with accessibility to basic necessities.

The lack of development in socio cultural tribes have been opined as probable causes of decreased wellbeing of the Indigenous tribes.(5) Indigenous communities can gain better access to services such as education, healthcare etc., by adopting the ideas and values of the dominant culture. Current analysis tried to establish correlation between basic services accessibility and health indicators. Literacy is positively correlated with proportion of fully immunized 12-23 months children. Increasing literacy rate is negatively correlated with prevalence of stunting, wasting, underweight and diarrhea among children. However, the literacy in further subgroups of gender and altitude was much higher as compared to national data of tribes given by government reports.(1) The probable reason is inclusion of districts' report in our analysis which include a sampled population based on methodology of NFHS-4. Hence these are indirect indicators. Economic survey 2020-21 constructed a Bare Necessities Index (BNI) at the rural, urban and all India level from two National sample survey rounds viz., 69th and 76th on Drinking Water, Sanitation, Hygiene and Housing Condition in India. Survey pointed to a positive correlation between access to bare necessities and better health and education outcome. It also observed improvement in child survival, decline in still births, malnutrition, and infant mortality with improved access to sanitation and clean drinking water. (6)

According to the NFHS-4 data, 94.7 per cent of children below five years of age and 83.2 per cent of women between the age of 15 and 49 in tribal district of Lahaul and Spiti in Himachal Pradesh were suffering from anemia.(7) The overall prevalence of malnutrition and anemia was higher as compared to general population, however those with access to electricity, drinking water and sanitation fared better. As the proportion of households with electricity increased a significant moderate to strong negative correlation was observed with nutritional indicators of children and adults. Improved drinking water and sanitation facilities are correlated with decrease in prevalence of diarrhea, symptoms of ARI and poor nutritional status of children under five-year age. Drinking water, sanitation, sewage disposal, electricity, rural roads, and urban transport influence human development outcomes. These basic services are provider dependent and governed by policy makers. However, health impact of a household's sanitation practices is affected not only by the household's behavior but also by the practices of the community.(8) For centuries the tribal population have suffered from neglect from policy point of view. Even today, areas where tribal live, the health services remain grossly underdeveloped and population access to good quality health services is at best terrible.(9)

Overweight and obesity among adults were positively correlated with increasing altitude. High blood sugar was negatively correlated with altitude however; high blood pressure was positively correlated with high altitude among tribals. This was in contrast to the notion that due to increased physical activity in high altitude ranges result in low obesity among these tribes. It is important to understand the multifactorial causation of these non-communicable diseases like socio economic status and urbanization.(10) The findings were concurrent with the meta-analysis findings by Rizwan et al. The pooled prevalence reported by two meta-analysis on tribals of India and on high lander tribals were comparable to those reported in current

analysis.(11,12) The high altitude climate has a potential of modifying morbidity and mortality of those who are permanently residing at elevations above 1500 meters.(13) Low barometric pressure and related low partial pressure of oxygen (hypoxia) and increased ultra violet radiation are components of the high altitude climate which are probably interacting in a complex way with genes and other environmental factors.(14,15)Upadhyay et al., in their systematic review on prevalence of diabetes among tribal population of India reported a range of prevalence from 0.7% to 10.1%.(16) The tribal populations are still at lower risk for having hypertension and diabetes as compared to general population. The increasing trend in low land tribal populations probably provides proof to the belief that even tribal populations are not immune to the health effects of modern lifestyles. It is need of hour to plan our interventions in prevention of non-communicable diseases in tribal population tailored to their existing lifestyle and customs.

STRENGTH AND LIMITATIONS

The accessibility as a factor has been discussed and followed in country for decades. However, the tribal population has lagged behind due to the inequalities prevailing. The strength of the analysis lies in the availability and usage of the national survey figures. However, the measures of exposure (accessibility and basic necessity indicators) are only a proxy based on the average in the population. The ecological fallacy can only be corrected by individual data from stratified population based on performance of tribal districts.

CONCLUSION

The core health and nutritional indicators in terms of immunization, prevalence of childhood diseases, anemia, and non-communicable diseases were better among those with access to basic necessity. Health infrastructure and services are not the only factors determining status of health. The socio behavioral determinants of tribal health play a key role in their health status. Ensuring the basic needs of a tribal population may be a step in improving their health.

AUTHORS CONTRIBUTION

All authors contributed equally in conducting the study and preparing the manuscript.

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