AN INVESTIGATION OF ROLE OF SPATIAL CHARACTERISTICS ON DISEASE PREVALENCE IN VADODARA DISTRICT, GUJARAT.

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SUMMARY

World Health Organization (WHO) defines health in the preamble of its constitution (1948) as, “Health is a state of complete physical, mental and social wellbeing and not merely an absence of disease or infirmity” (Park, 2009, 13). During the last few decades, the health status of the population of India has undergone some improvement.

The Research Problem

The death rate has gradually declined and life expectancy has gone up. Nevertheless, India’s health standards are relatively low as compared to those in the developed countries. India shows wide variation in death rate between rural and urban areas. Morbidity is dominated by communicable diseases. According to an estimate, about 17.2 per cent of all deaths and 20 per cent of all illnesses in India are due to communicable diseases. The major problems continue to be TB, filariasis, leprosy, malaria, diarrhea and malnutrition. According to the National Family Health Survey (NFHS) - India (1992-93), more than 53 per cent of all children under the age of four are underweight. Under nutrition is very high in the states of Uttar Pradesh and Bihar. Non-communicable diseases such as hypertension, diabetes and cancer as well as alcohol and drug abuse are slowly emerging as major health issues.

Spatial variations in the types of diseases and their prevalence within the country are also quite pronounced. Among all the states of the Union, the position of Gujarat state is however, relatively better. It also has a population growth rate that is lesser and a literacy rate that is higher than the respective National averages.

An attempt is made in the present research to study the relationship of spatial characteristics of the region with the prevalence of major diseases. For the purpose, one of the most representative districts of Gujarat, i. e. Vadodara, has been chosen. The basic intend is to evaluate the role of physical and social characteristics in the prevalence of diseases.

Objectives

The following objectives were set before the present research at the outset.

1. To identify the spatial patterns of major diseases prevalent in Vadodara district.
2. To identify the temporal variations in the disease pattern.
3. To assess the impact of availability and utilization of health care facilities.
4. To understand people's perception and level of awareness on health.
5. To examine the association of selected diseases with physical and social parameters at micro level.

Hypotheses

Based on the understanding developed from the available literature pertaining to spatial aspects of diseases, the following hypotheses have been formulated for verification.

1. Distinct physical and social characteristics tend to display different patterns of diseases.
2. With passage of time disease patterns and morbidity rates tend to undergo change/display spatial variations.
3. Level of availability and utilization of health care facilities determine the morbidity rates to a great extent.
4. People's perception and level of their awareness play a definite role in the disease pattern.

Sources of Data

The study is based on both secondary and primary sources of data. Data gathered from secondary sources, such as, Census of India publications , National Family Health Survey (NFHS) - 4, India and Gujarat - 2015-16, Rural Health Statistics in India Report, 2012 and Sample Registration System, Gazetteer of the Baroda State, Volume II - Administration, 1923 and Integrated Disease Surveillance Project. Primary information is generated through the use of structured household schedules, personal observation, conversation with the village elders and Rapid Rural Appraisal (RRA) techniques.

Methodology

The study is based both on secondary and primary data. Prevalence of major diseases in Vadodara district has been measured with the help of secondary data pertaining to various indices like number of cases, incidence rate, and morbidity rate and mortality rate etcetera. The secondary data have been tabulated and computed using appropriate statistical techniques, with the help of Microsoft Excel Software. Different mapping techniques have been used to analyze the patterns through Arc GIS 10.3. Available data on presumed causal factors collected from secondary sources have been analysed to comprehend the cause-effect relationships.

To compensate the limitations of secondary level data, the study has analyzed data generated at the primary level. For the purpose of primary investigation, random sampling method has been used at all levels, i.e. at the *taluka*, the village and the household levels. Based on the detailed study, the villages have been categorized into two groups and four villages from each group have been selected for detailed investigation at household level. Thus, a total of eight villages have been studied in detail with the help of secondary as well as primary data.

Review of Literature

Majority of the previous studies related to the present area of research clearly reveal that the physical environmental circumstances have been playing perceptible role in the incidence of certain diseases. The studies also make significant revelations pertaining to discrete aspects of health. The issue of health however, cannot be understood and analysed in a piecemeal manner. Rather, a holistic perspective needs to be developed to comprehend the issue. An attempt has been made in the present research to address the issue of health in its totality involving both the physical and social parameters. For the purpose, it is intended to undertake an in-depth investigation of the related physical and social parameters at micro level selecting a few representative villages of Vadodara district.

Organization of the Study

The introductory **first** chapter deals with the research question, objectives and hypotheses, methodology and sample size of the study area.

The **second** chapter deals with the literature review. The review includes contributions of scholars belonging to diverse disciplinary backgrounds from all over the World. The **third** chapter focuses on the study area of the research.

The **fourth** chapter is on the disease pattern in India. It focuses on health status of people in India, provides information on house type, drinking water, infant mortality rate, family planning, child health, maternal health, health care facility and prevalence of diseases in India.

The **fifth** and the **sixth** chapters provide district-wise and *taluka*-wise information pertaining to housing condition, child, women and adult health, and the prevailing diseases in the State and the district respectively.

The **seventh** chapter deals with the micro level analysis of the disease patterns in Vadodara district. This chapter focuses on the spatial and structural characteristics of the sample villages.

The **eighth** chapter focuses on the micro level study of the prevalence of diseases in the study area as well as the measures taken to prevent them.

The concluding **ninth** chapter summarizes there search and draws the conclusions. It can be concluded that health is not unidirectional rather it is multidirectional and is influenced and affected by several physical and cultural elements of the environment.

Study Area

Vadodara district extends over the eastern part of Gujarat state and lies between 21°50’ and 22^{0}50’ north latitudes and 72°50’ and 74°10’ east longitudes. Vadodara district is a part of the Gujarat Plains. The terrain of the district is flat level plain in the west, while the eastern part is a hilly tract and elevation varies between 300 meters and 520 meters amsl. The hilly area in the east comprises of plateaus, ridges and isolated relict hills. These hilly tracts are also covered with thick forests at some places and have been the traditional abode of the tribes. Narmada and Mahi are the principal rivers

draining through the district. The climate of the district is by and large hot and dry in summers and cold in winters. May is the hottest and January is the coldest month of the year. Three types of soils are found in the district, namely black soil, alluvial soil and hilly soil.

Agriculture is the main occupation of the people of the District. Farmers of the district grow both food and non-food crops. The principal food crops include maize, jowar, bajri, rice, wheat, pulses (tur and gram), groundnut and sugarcane. The principal non-food crops include cotton, tobacco and castor.

Vadodara district has good reserves of minerals of fluoride, black trap, quartz, fluorspar, agate, granite, gravel, marble, manganese ore and graphite. Vadodara district is well connected with Delhi (1028km.) and Mumbai (448km.) by Delhi Mumbai Industrial Corridor. The National Highway No.8 (NH8; new NH48) which connects Vadodara with major industrial centers of Gujarat such as Ahmadabad, Rajkot, Ankleshwar and Surat passes through the district. According to 2011 census, total population of the district has crossed the four million mark with 41,65,626 population. The ST segment of the population accounts for a significant proportion (27.60 %) of the total district population and is mostly confined to the rural areas of the eastern hilly *talukas*. The SC population is relatively less in proportion (5.32 %) and majority of it is urban by residence On an average, around 80 per cent (78.92 %) of the district population is able to read and write. While majority of the population of the western non-tribal and highly urbanized and industrialized *talukas* of the district like Vadodara (89.86%), Padra (81.03%) and Vaghodia (82.08%) have attained the aptitude of literacy, their counterparts in the eastern predominantly tribal and hill area *talukas* are still lagging behind (Chhota Udaipur - 43.51%, Kavant- 45.96%andNasvadi - 58.54%). Religious composition-wise, the district is dominated by the Hindus, particularly so in the rural areas of the district. Overall, population belonging to religions other than Hinduism account for very insignificant proportions, excepting for Islam which accommodates around a tenth (9.23%) of the total district population. Share of the populations belonging to other religions is seen to be relatively higher in the urban areas in comparison to the rural areas of the district. This is true even in the case of the Muslims. Their presence in the rural areas of the district is much less.

It is clearly evident from the analysis that there is great spatial variation within the district of Vadodara with respect to its physical and social characteristics. The *talukas* in the western part of the district display characteristics of a typically alluvial plain area having ample agricultural and urban-industrial prospects, dominance of the non-tribal population with higher level of awareness and exposure, and better connectivity. On the other hand, the eastern part is predominantly hilly and thus agriculturally less suitable and is the traditional habitat of the ST population which is mostly rural by residence and relatively less literate.

Major Findings

Living conditions and status of health in India as displayed through the discussion appears to be highly uneven over space. Dependence of households on the public sector health facilities in the country is relatively less (44.9%), without much of variation between rural (46.4%) and urban ((42.0%) areas. Lesser use of Government health facilities has been ascribed to distance (44.6%), timing (26.4%)and absence of health staff (14.8%), waiting time (40.9%), and quality of service (48.1%). Nonuse of the Government health care services happens to be extremely high in the states of Uttar Pradesh (80%), Bihar (77.6%), Punjab (72.9%) and Jharkhand (71.6%).

The achievement of the country in terms of certain living conditions that affect the health of the population, seem to have been satisfactory, while a lot needs to be done in case of others. The country has been able to provide improved source of drinking water to almost all (89.9%) of its population with minor variation between its urban (91.1 %) and rural (89.9%) areas. However, across the states and union territories the share of population availing the facility varies tremendously with Chandigarh (99.5%) at the top and Manipur (41.6%) at the bottom. Similarly, almost all (88.2%) of the households in the country have access to domestic electricity connection. On the other hand, much remains to be provided in terms of *pucca* houses, separate space in the house for cooking purposes, and LPG/natural gas for cooking purposes. On an average respectively only around 56.4per cent, 49.0 per cent and 42.3 per cent of the households in the country have these facilities. With respect to *pucca* houses, the rural segment of the population is much behind (41.3%) their urban (84.5%) counterparts. The difference between the rural

(40.9%) and urban (64.3%) segments in the context of separate space in the house for cooking is however relatively less. Use of LPG/natural gas as cooking fuel is extremely limited in the rural areas (23 %) unlike the urban areas (78.3%). Majority of the rural households depends on solid fuel such as wood, dung cakes, charcoal, and agricultural crop wastes and kerosene for cooking purposes. Use of such kitchen fuel is most common among the households of Bihar (81.9%) and Jharkhand (80.6%).

Analysis of health status in the country also reveals interesting results. The Total Fertility Rate (TFR)of women in the productive age group of 15 to 49 has reduced during the last few years from 2.7 in 2005-06 to 2.1 in 2015-16. The recent statistics reveal that the TFR in the urban areas has come down to 1.8 children, while in the rural areas it remains above this mark (2.4). The reduction in the fertility rate in the country might be due to increased awareness in the population about family planning methods as well as increased levels of literacy and education. It is observed that almost the entire married women population (99.6%) in the age group of 15 to 49 years and the total women population (97.8%) have the knowledge of contraception methods. The modern family planning methods used include female sterilization (36%), Condoms/*Nirodh* (5.6%), pills (4.1%), IUD or PPIUD (1.5%) and male sterilization (0.3%).

The TFR in India has declined from 2.7 (NFHS-2) to 2.2 (NFHS-4). However, the under-five mortality rate expressed in terms of deaths per 1,000 live births has remained very high in some of the states and union territories of the country like, Uttar Pradesh (78), Madhya Pradesh (64.6) and Chhattisgarh (64.3). Performance of Kerala is of course commendable, where under-five deaths per 1,000 live births are the least (7.1). The achievement of the country with respect to administration of vaccination to children between the age group of 12 to 23 months has been remarkable, although much remains to be done. While only 44 percent of these children have been recorded for having been vaccinated by the NHFS-3, the coverage increased to 66 per cent by the NHFS-4. Proportion of children of this age group who received all basic vaccines was 62 per cent. The problem of anaemia is found to be relatively higher among the females in comparison to the males (22.7 %) in the country with 53 per cent of them being anaemic (12.0g/dl). Among children, a very high proportion is anaemia in Dadar and Nagar Haveli (84%) and Daman and Diu (73.8%), and the proportion of anaemic children is the

lowestin Mizoram (19.3%). Prevalence of severe anaemia in the child population is recorded to be the highest in Delhi (4.1) and Chandigarh (4.0%) and the lowest in Manipur (0.2%). Among women, any form of anaemia is the highest in Dadra and Nagar Haveli (79.5%) and Chandigarh (75.9%), and the lowest in Mizoram (24.8%). Among men, any form of anaemia is recorded to be the highest in Meghalaya (32.4%) and lowest in Manipur (9.5%).

Prevalence of non-communicable diseases is increasing in the country. On an average, the country has around two per cent of the population in the age group of 15 to 49 suffering from diabetes. However, the proportion remains almost double in Andaman & Nicobar Islands (4.6%) and Kerala (4.3%). Among women, Meghalaya (4.6%) tops the rank while among males it is the highest in Kerala (4.3%). With regard to asthma too, higher proportion of women(1.9%) are affected in comparison to the males (1.2%). The problem of asthma is higher in the southern states. The largest percentage of women in Andaman & Nicobar Islands (4.5%) and Tamil Nadu (3.0%) are asthma patients. The highest percentage of males suffers from this ailment in Tamil Nadu (3.0%) and Puducherry (2.8%). Prevalence of goitre or any other thyroid disorder is also higher among females (2.2%) in comparison to males (0.5%). The problem of goitre is however much more acute among the women population of Kerala (8.1%) and Jammu Kashmir (7.0%). Among males, the highest proportion (2.0%) is affected by goitre in Tamil Nadu. With respect to heart diseases too, females (1.3%) of the country register a higher proportion in comparison to males (1.0%). The women of Jammu and Kashmir (4.5%) and Meghalaya (3.8%) and males of Lakshadweep (2.9%) are the worst suffers in this context. Prevalence of cancer seems to be scarce in the country with only around 0.3 and 0.2 per cent of women and men respectively suffering from the disease. The highest proportion women in Meghalaya (0.4%) and men (1.8%) in Tamil Nadu have been detected with cancer. Awareness about HIV/AIDS is substantially high in the country, where more than three-fourth of the females (75.6%) and almost all the males (88.9%) in the age group of 15 to 49 have some knowledge about it. On an average, around 0.24 per cent of the country's population has been detected HIV positive, without much difference between the registered cases among women (0.23%) and men (0.25%). The disease has a higher spread in the southern and north-eastern states followed by the central Indian

states. Prevalence of HIV/AIDS is a matter of serious concern in case of states of Mizoram, Manipur and Nagaland (1.48%) in the north east, Andhra Pradesh and Telangana (0.92%), Karnataka (0.53%) in the south, and Uttar Pradesh, Madhya Pradesh, Uttarakhand and Rajasthan (0.53%) in the north-central India. Consumption of tobacco in any form among the women folk in the age group of 15 to 49 is much lower (6.8%) than their male counterparts (45.5%). It is interesting to note that the proportion of women consuming tobacco in the rural areas (8.1%) is higher than in the urban areas (4.4%). Similar is the pattern in case of rural (48.0%) and urban (38.9%) men. Consumption of tobacco in the form of *paan masala* or *gutka* is more common. It is observed that consumption of tobacco in any form is higher among people with no schooling, the ST population, population belonging to Christian religion and people having lower wealth index. Alcohol consumption among women in the age group of 15 to 49 of the country is much less (1.2%) against almost one-third (29.2%) of their male counterparts doing so. However, in the northeastern states of the country in general and in the states of Arunachal Pradesh (26.3%) and Sikkim (23.0%) in particular, consumption of alcohol among women in the age group of 15 to 49is exorbitantly high. Slightly less than two-thirds (59%) of the males of Arunachal Pradesh in this age group have been reported alcoholic.

Gujarat was affected and dominated by communicable types of diseases in the past (1721-1949). The Prevalence of diseases like malaria, infection of the lungs, diarrhea, bronchitis, alimentary canal fever and skin diseases used to be common ailments in the State. There were also epidemics of leprosy, scrofula and influenza. According to the National Family Health Survey (NFHS-4,Gujarat),91 per cent of the households in the State have access to safe drinking water, 77 percent households live in *pucca* houses and 96 percent households have domestic electricity connection. Open defection is fast decreasing and is associated with less than a third (29%) of the households. The TFR is 2.0 children per women in Gujarat state, which has declined by 0.6 children. Almost everyone in Gujarat has the knowledge of contraception. Avery high proportion (81%) of mothers has received antenatal care (ANC) for their last child birth from skilled health personal.

Infant Mortality Rate (IMR) is 34 deaths per 1,000 live births in Gujarat. Half of the (50%) children in the age group of 12 to 23 months have taken all basic vaccinations for the childhood diseases such as tuberculosis, diphtheria, pertussis, tetanus, polio and measles. People are affected by communicable as well as non-communicable diseases and there is shift from communicable to non-communicable type of diseases. The common diseases are tuberculosis, diabetes, heart diseases, cancer and hypertension. The prevalence of medically treated tuberculosis is 169 persons per 1,00,000 population. Diabetic women are higher (1,163 per 1,00,000) than diabetic men (1,069 per 1,00,000 population).Similarly, more women (1,348) in a population of 1,00,000 have been affected by asthma than their male counterparts (934). Gujarat population is almost entirely free from the problem of goiter.

Diseases affecting higher proportion of men than women include, heart diseases and hypertension. While 476 men suffer from heart ailments, 327 women per 1,00,000 population are affected by it. Hypertension cases are 14 per cent among men and 11 per cent among women. Consumption of tobacco in the form of *gutkh, paan masala* and cigarettes or *bidis* is relatively higher (51%) in the State as compared to the country (45.5%).

Non-communicable diseases take the maximum share of deaths in the country. Although the situation in Gujarat is similar to that in the country, proportionately (47%) less deaths take place in the State than in the country due to such diseases. Deaths due to injuries (9%) are also less in the State than their National average. Rather, the share of deaths caused by communicable, maternal, perinatal diseases and undernutrition is higher (32%) in the State than in the country as a whole. So also is the case with respect to deaths due to symptoms, sign and ill-defined conditions.

Anaemia is a severe health issue in Gujarat particularly among women (55%) and children (63%). This compares very poorly with the National scenario (53.3% in women and 58.4% in children).The share of anaemic women is very high in the districts of Dangs (72.2%), Sabarkantha (67.2%) and Gandhinagar (65.8%). The lowest proportion of anaemic women is in the district of Surat (39.0%). The male segment of the State population is relatively better with around one-fifth (22%) of them reporting anaemic. Malnutrition in children and adults is another acute health problem. Higher under

nutrition in children is recorded in the rural areas than in the urban areas of the State. Among adults, under nutrition is more in the younger segment (15 to 19 years of age), in the rural areas and among ST population. Among infectious diseases, the State has on record the incidence of cholera, diphtheria, hepatitis, enteric fever and dengue. Amongnon-infectious diseases, the prevalence of diabetes and asthma is higher amongst the population than heart diseases and cancer.

Use of public health care system in Gujarat by the households is relatively lower (42.8 % in all areas, 34.2 % in urban areas and 49.8 % in rural areas)than the National average (44.9%). Rather, use of private health care system (56.1%) is more widespread in the State(64.4% in urban areas and 49.3% in rural areas) and is higher than in the country in general (51.4%).

In terms of majority of the basic amenities like housing, electricity supply, improved source of drinking water, defecation and schooling facilities etcetera, it can be said that the State has an upper edge over the Nation as a whole.

In the final analysis, it would not be wrong to say that, despite better infrastructural facilities including health infrastructure, basic amenities and higher level of literacy and general awareness in the population about different issues relating to health, the State exceeds in the incidence of certain diseases compared to the Nation as a whole. The situation therefore is not only a matter of concern, but also deserves closer scrutiny.

The analysis of data provided in the Integrated Disease Surveillance Project(IDSP) Vadodara (Gujarat) Report and the Rural Health Statistics (RHS), India 2017Report in this chapter, makes significant revelations pertaining to the status of health care facilities in India and in the state of Gujarat. Prevalence rate of fever in the year 2009, varied between 1.22 to 4.43persons per 100 population. The highest prevalence rate (4.43) of fever was reported in Chhota Udaipur *taluka* followed by Savli*taluka* (4.27). It may be recollected here that while the earlier *taluka* belongs to the group of hilly, forested and predominantly tribal *talukas*, the latter lies in the predominantly non-tribal dominated plain areas. The prevalence rate is however the lowest in two of the *talukas* of the first group, namely Jetpur Pavi (1.22) and Karjan (1.57). Prevalence of acute diarrhoea disease seems to affect people in the plain areas more than in the hilly and

forested areas. Highest prevalence rate of acute diarrhoea is seen in Vaghodia (1.44) and Vadodara (0.92) *talukas*, while it is the lowest in the Jetpur Pavi *taluka* (0.47). Malaria P.V. is a common type of malaria and highly prevalent in India. It is interesting to note that the highly urbanized *taluka* of Vadodara (0.10) and the hilly and forested Chhota Udaipur *taluka* (0.09) have registered the highest prevalence rates of malaria P.V.On the other hand, less urbanized *talukas* of Dabhoi (0.02) and Sinor (0.02) with plain topographic conditions have the lowest prevalence rates of the disease. This pattern may be the result of the fact that both urbanization with its typical characteristics and, hilly and forested ecology provide conditions suitable for the spread of the disease. It is clear that major types of diseases that grip Vadodara district are, infectious diseases like, acute diarrhoea, cholera, enteric fever**,** malaria, measles, chikungunya, dengue fever, leptospirosis and chickenpox etcetera

A comparison between the number of available health care services and manpower in the health sector with their respective prescribed numbers clears the picture on their sufficiency or insufficiency. The analysis reveals that Gujarat is much better placed in comparison to the country as a whole with reference to health infrastructure and health sector manpower, with a few exceptions. With respect to health infrastructure, unlike the country, the State is privileged to have a surplus number of PHSs, PHCs and CHCs. The country has around 20 or more per cent shortfall in these services. There is, in general, a shortfall of manpower in the health sector of the country. In this context too, the position of Gujarat is better in comparison to the country excepting with respect to the availability of female health workers (ANM) at the PHSs and PHCs and different specialists at the CHCs. It is pathetic to note that the shortfall of specialists at the CHCs in the country (82%) and in the State (94%) is extremely high. Similarly, the availability of radiographers at the CHCs is highly insufficient at both the National (65%) and State (55%) levels. There is 40 per cent shortfall of laboratory technicians at PHCs & CHCs in India. The analysis clearly indicates that there is great dearth of specialist doctors and other medical staff in the country.

The required data on spatial and structural characteristics of the sample villages were generated through primary investigation to highlight aspects that are directly or indirectly related to the health of the population. For the purpose, information has been

gathered from the selected villages of Vadodara district through primary survey with the help of structured household schedules, personal observations and RRA technique. Random sampling method has been adopted at all levels. The study has considered four predominantly tribal/hilly *talukas* and four non-tribal *talukas* from the plain areas of the Vadodara district. One village each from all the eight *talukas* has been selected as representative sample of the *talukas* for in depth investigation.

A minimum of fifty households from each of the eight sample villages were selected. This was purposefully done to keep the sample size manageable. Depending on the total number of households in the sample villages, the percentage of households surveyed for the study varied between 2.61 per cent in village Vadu to 18.38 per cent in Palasani village. The proportion of population covered varied between 3.48 per cent in village Tejgadh and 19.64 per cent in village Palasani.

The study reveals that large proportions (49%) of the households of the non-tribal and 33.00 per cent households of the tribal are landless. The population of the sample villages belongs to Hindu and Muslim religions. The population belonging to the Muslim religion is highest in the non-tribal villages and majority (58.06%) of the Muslim households is landless. Similarly, the SC households belong to the non-tribal villages and are mostly landless. The incidence of landlessness in the tribal villages is however relatively less (30.52 %).

A large segment (more than 70%) of the population in both types of villages is in the working age group of 15 to 59 years – to be specific 70.39 per cent in the non-tribal and 72.11 per cent in the tribal villages. The proportion of population in the senile age group of 60 and above is also significantly high, which is an indication of higher life expectancy.

There emerges no noticeable association of the Body Mass Index (BMI) with land size categories in the tribal villages, while the non-tribal villages display some association. It is clear that in the non-tribal villages, the proportion of underweight population tends to decrease with increasing size of land holdings.

Marital status of the population in the two types of villages is by and large similar with slightly above half the population ever married and around two fifth (42%) of the population unmarried. There is complete absence of never married category people in the

tribal villages, while a small proportion (0.21%) of the population of the landless households in the non-tribal villages reported as such. The incidence of death of the spouse is reportedly higher in the non-tribal villages in comparison to the tribal villages. While separation from the spouse is uncommon in the non-tribal villages, it is reported in small proportion (0.34%) among the landless households of the tribal villages. Any relationship between marital status of the population and land size holding is not noticed.

Study reveals that a very large proportion of the population in both types of villages is engaged as main worker and majority of them are engaged in agricultural activities. While the proportion of the main workers in the non-tribal villages is 79.57 per cent (41.58% cultivators and 37.99 agricultural labourers), it is higher (86.76%) in the tribal villages (49.19% cultivators and 37.57% agricultural labourers).This is indicative of the fact that non-agricultural sectors provide lesser economic opportunities in the tribal villages. Even animal rearing is uncommon in the tribal villages, while 1.79 per cent of workers in the non-tribal villages are engaged in this activity.

It can clearly be seen that with increase in the land holding size the proportion of cultivators increases and the proportion of agricultural labloures decreases. This is true in case of both non-tribal and tribal villages. Workers belonging to all land size categories of the tribal villages earn their bread through all types of activities in varying proportions and/or seasonally migrate out in search of work. Limited scope of the agricultural sector in the village or in the neighbouring villages forces the wage earners to migrate out to in search of agricultural work and casual labour in the urban unorganized sector. On the other hand, in the non-tribal villages, the large land owners generally refrain from any type of wage earning. Rather, a few of them are engaged in business and service sector. Being located nearer to the urban-industrial center of Vadodara, the proportion of workers engaged in the service sector is much higher (10.75%) in comparison to the tribal villages (4.19%) which are located relatively farther away. It is worth noting that the highest proportion workers engaged in business and services in both types of villages belong to the landless households followed by the households with the largest size of holdings.

One can notice a very clear association of level of income with the land size holdings, i.e. larger the size of land holding, higher is the level of income. This is more so

in the non-tribal villages, where ten or less per cent of the households without land or with small holdings (less than 2 acres) find a place among the high income category. On the other hand, none of the households with more than 2 acres of land are placed in the low income category. The situation in the tribal villages is however, slightly different, wherein no clear pattern emerges. But, a large proportion of the landless households in the tribal villages are better off in comparison to their non-tribal village counterparts. While more than 90 (90.82%) per cent landless households in the non-tribal villages fall under medium or low income category, in the tribal villages their proportion is much low (77.28%). However, unlike in the non-tribal villages, no clear cut association between level of income and land size holding can be observed. One can find some households reporting under the low and medium income category despite having large land holdings. This may be due to the quality of land, lack of required agricultural infrastructure and method of cultivation etcetera.

With respect to percentage of households having domestic electricity connection, the State as a whole (96%) lags behind the National average of 97.5 per cent. The sample villages of this study too display a similar situation. The tribal villages however compare better with the National average than the non-tribal villages. But, in both types of villages, the households without domestic electricity connection belong to the smaller size land owners.

Toilet facility is one of the most important requirements for maintaining good health, hygiene and sanitation in any area. Unfortunately however, this facility is not available to all the households of either type of village. One even does not find any association of toilet facility with land size holdings, although a higher proportion of the households in the large size holding category have access to toilets.

There are several Government sponsored schemes pertaining to housing, employment, education and health etcetera for the rural population. However, the surveyed population in the sample villages have availed the benefits of housing under the *Sardar Awaas / Indira Awas* Scheme only. Although one does not notice any clear pattern by land size holding in availing the facility, the families of every land size category of the tribal villages unlike the families of the non-tribal villages, have availed the facility in varied proportions.

A significant proportion of the houses in both types of villages are either *kutcha* or semi *pucca*. This is more so among the households with no land or small land holdings. Relatively higher proportion of the large land owning households of the non-tribal villages have been able to construct *pucca* houses in comparison to their counter parts of the tribal villages.

Majority of the houses belonging to landless, marginal and small land owning households have mud floors. On the other hand, majority of the houses belonging to the large land owning households have concrete floors. Similar is also the pattern with reference to the roof of the house. The highest proportion of houses belonging the landless and small and marginal land owning households have either thatched or asbestos roofs. However, in the tribal villages, one does not come across any association between size of land holding and type of floor or roof.

Availability of sufficient living space in a house prevents spread of diseases. For example, spread of respiratory ailments, tuberculosis and skin disease is enhanced due to lack of sufficient living space in the house. Majority of the large land owners in both types of villages, have more than one room in their houses and vice versa. With increasing size of land holding, the proportion of households having three or more number of rooms increases with minor deviations.

The condition of ventilation in the houses surveyed was observed to be either good or moderate in majority of the households of both types of villages. The ventilation is bad in only around 11 and 4 per cent of the households in the non-tribal and tribal villages respectively. These households mostly belong to the landless or marginal and small land owners.

Condition of cleanliness is assessed in terms of arrangement of things in the house, sanitation and hygiene etcetera. It is interesting to note that the condition of cleanliness is relatively better in the houses of the tribal villages in comparison the non-tribal villages. The houses with larger size of land holdings have good or moderate type of cleanliness, whereas most of the houses noted under the bad cleanliness category belong to the landless and marginal and small landowners. The highest proportion (21.43%) of unclean houses is seen among the landless category households of the non-tribal villages.

Location of the residential unit has definite implications on human health. Specially, residential units located in the low lying, flood prone marshy areas remain highly susceptible to various types of water borne diseases. A good proportion of the residential units are located in low lying/flood prone marshy area or near water bodies like, river, pond and water logged area. Some units of the non-tribal villages belonging to the households without any land are also located near garbage dumping area and industrial area, where chances of getting affected by pollutants become very high. The tribal villages, because of their hilly and undulating topographical characteristics, have a lesser proportion of residential units located particularly in the low lying/flood prone marshy areas. In fact, characteristically, the tribal villages under investigation like all other tribal villages of mid-Indian tribal belt are located far away from the flood prone areas of the plains. Rather, water logging of the low lying areas during the rainy season remains an issue in such areas. Besides, absence of industries in the tribal belt in general and in the sample villages in particular has enabled the population to remain away from industrial pollutants and garbage. As far as the association of residential units by land size category with the type of locations is concerned, it is difficult to conceive any definite pattern, particularly in the tribal villages. However, in the non-tribal villages, one can see some sort of relationship, wherein majority of the large land owners have their residential units away from low lying and polluting areas and some of the landless families have their residential units in the low lying and polluted areas.

Availability of safe drinking water is an essential requirement for good health. A large percentage (64.93%) of the households in the non-tribal villages has access to piped water that is supplied through the Government after being properly treated. On the other hand, less than half (48.89%) of the households in the tribal villages have access to such water supply. Use of ground water through hand pumps serves the purpose of a substantial percentage (43.11%) of households in the tribal villages. One fails to notice any relationship between land size holding and access to safe drinking water in either type of villages.

Availability of space for kitchen is also related to human health. If there is no separate space for kitchen in the house and food is cooked in the living room, then the smoke generated can cause indoor air pollution and lead to different respiratory diseases.

Majority of the houses in the non-tribal (58.00%) and tribal (54.50%) villages do not have a separate space for the purposes of cooking. The average picture however, tends to differ across different land size categories. A clear pattern emerges, where larger the size of land holding, higher is the proportion of households with separate space for the kitchen. This generalization holds true for both types of villages. Thus, maximum percentage of households in both types of villages does not have separate space for kitchen and it is more so among the households with no land or with less land.

Traditional cooking fuel creates air pollution with emission of large quantities of smoke containing carbon dioxide, which in turn leads to breathing problem and diseases related to respiratory system. Unfortunately, in either type of villages, only around one fifth of the households use biogas and LPG for cooking purposes, which are harmless. Households in the tribal villages are relatively better off with regard to the use of wood, as only 22.46 per cent of the tribal households use wood for cooking against 50.78 per cent in the non-tribal villages. However, use of kerosene (22.46%) and dung cake (29.95%) is much higher in the tribal villages in comparison to the non-tribal villages. With regard to variation across land holding size in the use of harmless cooking fuel, one can see a direct relationship. With increasing size of land holding, the use of biogas and LPG increases in both types of villages. While majority of the landless and small land owning households depend on kerosene, wood and dung cake, majority of the large land owners make use of modern cooking fuel, particularly LPG.

It can be said that every household in the non-tribal villages, has at least one or near to one asset helpful in dissemination of information and knowledge, such as TV and mobile. However, possession of radio and computer is very less. Possessions of assets helpful in transportation are not very satisfactory.

Possessions of livestock in the tribal villages are relatively less in comparison to the non-tribal villages.Almost half of the households in the non-tribal villages have some kind of livestock, wherein buffalo is very common. Possession of other domestic animals is very less per household in the non-tribal villages. Possession of livestock in the tribal villages is relatively higher than in the non-tribal villages. Here again, possession of buffaloes is very common. Although households of every category of land size is in possession of cow and bull, other domestic animals like goat donkey and chicken are

mostly nurtured only by the landless and households with smaller pieces of land, particularly of the tribal villages. It is interesting to note a direct relationship between land size holding and possession of livestock in both types of villages. In other words, larger the size of land holding, higher is number of livestock per household. The share of households keeping livestock inside the living area is much higher in the non-tribal villages than in the tribal villages.

A large segment of households in both types of villages has not been designated as either BPL or APL. Meaning there by a significant proportion of the households in the sample villages has not been issued any type of card. However, from among those designated and issued card, the proportion of BPL card households is much higher in the tribal villages as compared to the non-tribal villages, indicating a higher level of poverty in the former.

Data generated through primary investigation has been used to calculate the prevalence of a few diseases in the study area. Prevalence of non-communicable diseases is found to be higher in the tribal villages than in the non-tribal villages. Similarly, prevalence of respiratory diseases is also much higher in the tribal villages in comparison to the non-tribal villages. On the whole, higher proportion of the population in the tribal villages is affected by all types of diseases excepting for intestinal and zoo nose diseases. There is of course only a marginal difference between the two types of villages with respect to the latter two categories of diseases.

Unlike in the non-tribal villages, in the tribal villages no clear association between the prevalence of diseases and land size category is discernible. However, in case of the diseases that have affected the population of every category of land size holdings, such as respiratory, arthropod borne and intestinal diseases, the population of the medium sized land holdings have registered the maximum number of affected persons. The population of the largest size of land holding (5.00 acres & above) have relatively less number of persons affected by non-communicable, respiratory and surface infection diseases. Besides, this population is absolutely free from other types of diseases found in the population of other land size categories. On the whole, non-communicable diseases which include diabetes, cancer, paralysis and joint pain etcetera are very common and relatively highly prevalent in the tribal villages. From among the communicable diseases,

respiratory diseases, arthropod-borne diseases and intestinal diseases are more prominent in the population of the tribal villages.

The study reveals that a good proportion of the population in the sample households of either type of villages is not very conscious of the problem of malaria and refrains from taking precaution towards it. On the whole, around half the population in the study area reported of not taking any step to protect themselves from diseases caused by mosquitoes. Larger proportions of the households in the tribal villages use *neem* smoke and mosquito coil. A substantial proportion of the households in the non-tribal villages also manage only with use of fans to avoid mosquito bite.

To assess the level of health consciousness in the sample population, an attempt was made to record the percentage of households taking three specific actions. The three actions are, availing the mid-day meal facility provided to children in the school, providing dietary supplement to children at home, and registration of expecting mothers under the Ma Yojana of the Government. With regard to these actions, minor difference is marked between the two types of villages. While the percentage of households availing mid-day meal facility and providing dietary supplement is higher in the tribal villages, a higher percentage of households of the non-tribal villages has taken advantage of the Ma Yojana. Any difference in these actions across land size categories of both types of villages is also not noticed.

About 60 per cent of the households in the non-tribal villages avail the facilities of the Government PHCs, sub centers and hospitals, which is higher in comparison to the tribal villages. Reverse is the situation in tribal villages with respect to visits to private doctors for health check. While almost two-fifth of the households in the tribal villages depends on the private doctors, this proportion is slightly less than one-fourth in the non-tribal villages. However, one can clearly mark that visiting the private doctor is proportionally the highest among the households belonging to the largest land size categories. Lesser utilization of Government health care services by the tribal households may be related to the problems of inappropriate timing, absence of doctors, and lack of other infrastructural facilities, like medicines and machines at the health units. The practice of visiting the witch doctor or *bhua* for treatment during illness still survives among the sample population and around one-tenth of the households of both types of

villages reported of following it. Dependence on traditional medicines administered at home is very insignificant in both types of villages, although the proportion of households adopting the practice is higher in the non-tribal villages in comparison to the tribal villages. Visiting the *bhua* or using home remedies is either absent or very low in case of the largest land size categories of both types of villages. Treating patients at home with traditional medicines is mostly confined to the households belonging to the landless and the smallest size land holdings, particularly of the non-tribal villages. The percentage of households taking advantage of the ongoing health schemes is highly insignificant; more so in the tribal villages. However, almost the entire sample population is immunized against different diseases. The proportion of households that have got their members immunized is by and large same in both types of villages.

Among all the health personnel, the maximum percentage of households in the non-tribal villages contacts the ANM. The LHV, the *anganwadi* and the ASHA workers are contacted by around a third of the households of these villages. The *dai /* TBA worker is contacted by about a fifth of the households, while the MPW health personnel seem to have very less significance in the non-tribal villages. Between the non-tribal and tribal villages, there is minor difference with respect to contacts with the ANM, LHV, *anganwadi* and MPW and personnel.

However, a much greater proportion of the households are in touch with the ASHA personnel in the non-tribal villages and a much lower proportion of the households are in touch with the *dai/*TBA personnel in the tribal villages. Contact with ANM *anganwadi* and ASHA workers in both the types of villages are higher in comparison to other health workers. A higher percentage household contacting the *dai*/TBA in the non-tribal villages in comparison to the tribal villages signifies that the people in the tribal villages are more health conscious. Majority of the tribal households are contacting the trained health personnel like the ANM, ASHA workers instead of the untrained *dai*/TBA worker. More than 90 per cent of the expecting mothers in the two types of villages have availed the antenatal care facility, which is a good sign of development in the health sector of Gujarat state.

It is surprising to note that a significant proportion of the households in both types of villages perform the child delivery at home, which is not considered safe. Proportion

of such households is relatively higher in the non-tribal villages, where only 62.50 per cent of the households make use of any type of hospital facility for the delivery of the baby. The situation in the tribal villages is rather better, where almost three fourth of the households prefer delivery of the child in some equipped medical centre.

Awareness about family planning measures seems to be very high in the sample population. Less than ten per cent of the households in both types of villages reported ignorance about any family planning measure. In other words, around 90 per cent of the households are aware of the family planning measures in both types of villages. However, it is in the tribal villages where almost all those who are aware, are making use of the knowledge. Compared to this, the proportion of households using any family planning method is much smaller in the non-tribal villages. It is interesting to note that the segment that is unaware belongs to the landless category only of the non-tribal villages, and the landless and the smallest land holding households in the tribal villages.

It is established that greater awareness about basic vaccination in children, family planning measures, and contact with the health personnel, such as ANM, LHV, *anganwadi, Dai/*TBA and the ASHA workers, and use of antenatal care from the skilled personal has helped in maintaining low morbidity and mortality rates in the State as well as in the sample villages. Thus, the fourth hypothesis which states, 'people's perception and their level of awareness play a definite role in the disease pattern' stands validated.

The health problem of the population that is served by the Government sponsored health care facilities is mitigated to a very great extent due to the qualities in the staff attached to it. On an average around 95 per cent of the respondents of the two types of villages reported the quality of staff as average and above average. The remaining respondents accounting for around five per cent of all respondents seem to have had bad experiences with the staff. Similar to the impression on attitude and behavior of the health unit staff, most respondents consider that hygienic condition is average or above average in the health units in their villages.

There are many problems faced by villagers in utilizing health facilities of the Government health units. Lack of equipments, poor performance and distance emerged as the most common constraints for the people in using the Government health infrastructure. A small proportion of the households in the non-tribal and tribal villages

identified distance as the reason for which they prefer going to the private doctor instead of Government health center.

Around a fifth of the males reported consumption of tobacco in both types of villages. Among the females tobacco consumption seems to be not very common in either type of villages. Alcohol consumption in males of the non-tribal villages is mostly restricted to a very small proportion of population in the landless only. Alcohol consumption in females is all most absent. Alcohol consumption in the tribal villages is more among males, and a small segment of the females of the landless households are also addicted to it.

An attempt was made in the present research to examine the percentage of households in the sample households permitting independent decision making power to their women family members. The female members in about two-fifth of the sample households are completely ignored while taking any decision. Women in the non-tribal villages seem to be more deprived as the decision of the husband becomes binding on them. The share of such households in the tribal villages is relatively less. The implication is, women in tribal villages enjoy higher autonomy in comparison to their counterparts in the non-tribal villages. This becomes further established by the almost double percentage of households in the tribal villages than in the non-tribal villages, where women enjoy full freedom to take decision. Even the percentage of households where decisions are taken jointly, is higher in the tribal villages, although marginally. This may be due the traditional character of the tribal societies, where gender biasness is uncommon. Land size category wise too, one fails to find any pattern in this respect in the tribal villages. On the other hand, a discernible pattern is visible in case of the non-tribal villages, where autonomy of women seems to increase in terms of decision making power in family matters, with increase in the size of land holding. The decisions are taken solely by the husband in higher proportion of landless and small and marginal land holding households. Greater proportions of households among the large size land owing households give equal importance to both the members and take decisions jointly.

Analysis of the perceptions and suggestions of the population on the Government health care services of their area reveals that there is scarcity of specialized doctors, machines and medicines in the non-tribal villages. Respondents also reported about

inappropriate timing of the doctor in these villages. The respondents of the tribal villages also expressed similar opinions on specialized doctors, medicines and machines. Over and above these, the issue of absence of doctors from duty was reported from the tribal villages.

Conclusion

An attempt is made in the present research to assess the role of physical and social characteristics in the prevalence of diseases in sample villages of Vadodara district. The major disease that grip Vadodara district are common infectious diseases, such as, acute diarrhoea, cholera, enteric fever**,** malaria, measles, chikungunya, dengue fever, leptospirosis and chickenpox etcetera.

Primary micro study reveals that large proportions (49%) of the households of the non-tribal and 33.00 per cent households of the tribal are landless. Significant proportion of the houses in both types of villages are either *kutcha* or semi *pucca*. This is more so among the households with no land or small land holdings and the large land owning households live in *pucca* houses. Majority of the houses in the non-tribal (58.00%) and tribal (54.50%) villages do not have a separate space for the purposes of cooking. However, use of kerosene (22.46%) and dung cake (29.95%) is much higher in the tribal villages in comparison to the non-tribal villages. A good proportion of the residential units are located in low lying/flood prone areas or near water bodies like, river, pond and water logged areas. On the whole, around half the population in the study area reported of not taking any step to protect themselves from diseases caused by mosquito bite. Majority of the households in the non-tribal villages depend on the most effective method of using mosquito net (59.21%), which is not so popular a method in the tribal villages (12.50%). Rather, a larger proportion of the households in the tribal villages use *neem* smoke (54.17%) and mosquito coil (25.00%). One does not notice any direct correspondence between land size holding and use of preventive methods against mosquito bite in either type of villages.

The TFR in India and Gujarat has been declining. The TFR of 2.0 children per women in Gujarat state has declined by 0.6 children. Almost everyone in Gujarat has the knowledge of contraception and in sample villages it was found that around 90 per cent of the households are aware of the family planning measures in both types of sample villages.

A very high proportion (81%) of mothers has received antenatal care (ANC) for their last child birth from skilled health personnel in Gujarat. Micro study also revealed that more than ninety per cent of the women in the non-tribal (94.50%) and tribal (93.00%)villages are making use of the antenatal care facility at the PHC. In the sample tribal villages around two-third (74.50%) of the households prefer delivery of the child in the health institution, which is more than in the non-tribal villages (66.67%).

Use of public health care system in Gujarat by the households is relatively lower (42.8 % in all areas, 34.2 % in urban areas and 49.8 % in rural areas)than the National average (44.9%). Rather, use of private health care system (56.1%) is more widespread in the State(64.4% in urban areas and 49.3% in rural areas) and is higher than in the country in general (51.4%). It is pathetic to note that the shortfall of specialists at the CHCs in the country (82%) and in the State (94%) is extremely high. The analysis reveals that Gujarat is much better placed in comparison to the country as a whole with reference to health infrastructure and health sector manpower, with a few exceptions. With respect to health infrastructure, unlike the country, the State is fortunate to have a surplus number of PHSs, PHCs and CHCs. About 60 per cent (58.95%) of the households in the non-tribal villages avail the facilities of the Government PHCs, sub centers and hospitals, which are higher in comparison to the tribal villages (49.9%). Lesser utilization of Government health care services by the tribal households may be related to the problems of inappropriate timing, absence of doctors, and lack of other infrastructural facilities, like medicines and machines at the health units. Perception of people on hygienic condition and staff behavior in PHC, vary between average to good, this indicates that still there are chances for improvement. There is of course only a marginal difference between the two types of villages with respect to the latter two categories of diseases. Thus, as hypothesized at the outset of the research, it is established that ‘the level of availability and utilization of health care facilities determine the morbidity rates to a great extent’.

Mortality by non-communicable diseases takes the maximum share of deaths in the country. Although the situation in Gujarat is similar to that in the country, proportionately (47%) less deaths take place in the State than in the country due to such diseases.

Anaemia is a severe health problem in Gujarat particularly among women (55%) and children (63%).Among infectious diseases, the State has on record the incidence of cholera, diphtheria, hepatitis, enteric fever, malaria and dengue. Among non-infectious diseases, the prevalence of diabetes and asthma is the higher amongst the population than heart diseases and cancer. In the sample villages there are 17.89 per cent population which is thin or overweight (BMI<18.5).

Micro study of the sample villages revealed that communicable and non-communicable diseases are found in the sample villages. Prevalence rate of non-communicable diseases were high in both types of sample villages. Followed by respiratory groups of diseases, which includes tuberculosis, whooping cough, acute respiratory infection etcetera, shows strong positive relationship with burning solid fuels. Other intestinal diseases include acute diarrhea, cholera and typhoid fever and shows positive association with open defecation and unimproved sources of drinking water. Third type of communicable disease is arthropod borne diseases, in which malaria is common, and is found to be positively related with the houses located in near water logged area, near natural water bodies, near marshy, hilly, forested area. The first hypothesis that, 'distinct physical and social characteristics tend to display different patterns of diseases' get validated again by this finding. Malaria is common to both types of sample villages and water logging and dense forest respectively emerge as the major causes of malaria in the non-tribal and tribal villages.

From among the communicable diseases, respiratory diseases, arthropod-borne diseases and intestinal diseases are more prominent in the population of both types of villages. On the whole, non-communicable diseases which include diabetes, cancer, paralysis and joint pain etcetera are very common and relatively highly prevalent in the tribal villages. Near to twenty per cent of the male population consumes tobacco in different forms which is one of the risk factor for the cardiovascular diseases and cancer etcetera.

Based on the forgoing analyses, it can be said that over time, the pattern of diseases in the country has been changing from infectious or communicable diseases to non-communicable diseases. Similar temporal change in the pattern of diseases is also

observed in the state of Gujarat. This proves the second hypothesis that states, 'With passage of time, disease patterns and morbidity rates tend to undergo change/display spatial variations'.

The study also revealed that there is scarcity of specialized doctors, machines and medicines in the Government health care centers of the sample villages. Respondents also reported about inappropriate timing of the doctor in these villages. Over and above these, the issue of absentee doctors was reported from the tribal villages.

In the final analysis, the following conclusions clearly emerge out of the present research.

1. Distinct physical and social characteristics tend to display different patterns of diseases.
2. With passage of time disease patterns and morbidity rates tend to undergo change/display spatial variations.
3. Level of availability and utilization of health care facilities determine the morbidity rates to a great extent.
4. People's perception and level of their awareness play a definite role in the disease pattern.

Suggestions

Based on the findings and conclusions of the present research, the following suggestions may be forwarded in the context of health studies and policy.

Awareness about diseases, their causes and the preventive measures that are available through the health care systems is very essential at all social, community and individual levels. The present study indicates that awareness on different vaccinations including those meant for the children, use of contraception, use of ANC etcetera in the population of the sample villages is satisfactory. However, awareness on hygiene**,** sanitation and open defecation is highly lacking in the sample villages, for which the incidence of diseases like acute diarrhea, cholera, typhoid fever etcetera have affected a significant proportion of the population in the sample villages, Although the *Swachh Bharat Abhiyan* (SBA) or *Swachh Bharat Mission* (SBM) has been initiated by the Government since 2

October, 2014, the effects are yet to reach the households in the study area. This is evident from the high share of people going for open defecation. There is an urgent need to create greater awareness in the population regarding hygiene, sanitation and use of toilets.

Prevalence rate of anaemia and under nutrition at National and State levels as well as in the study area is found to be very high. The two emerged as the most important health problems in the sample villages. It should be taken into consideration very seriously by the concerned authorities and agencies and, appropriate actions should be taken to mitigate them.

Poverty is one of the major problems prevailing in the sample villages, especially among the landless and marginal and small farmers, and is indirectly responsible for the health problems. Near to thirty per cent households in non-tribal villages and near to forty per cent households in tribal villages have been registered to be below the poverty line. It is necessary to devise means for their alleviation from this level.

Around half the population in the study area reported of not taking any step to protect themselves from diseases resulting from mosquito bite. There should be awareness at community and individual level for protection from mosquito bite. There should be implementation of malaria control program in malaria endemic areas.

Steps should be taken to ensure the presence of the medical staff at the Government health centers. The provision of the required machines and medicines at the health units should also be ensured.

Limitations of the Study

Major limitations faced by the researcher are related to the available data in the secondary sources. The official sources of health data in the country in general and the State in particular, do not provide detailed information on all types of diseases. The available data are also not provided systematically.

The findings and the conclusions of the present research need to be examined further with the help of data generated not only from other areas of the country but also by taking a larger number of samples. Detailed analysis of the role of particular physical and social characteristics, the role of availability and utilization of the health care

facilities, the role of awareness and perception of the target population and the role of the health staff on the prevalence of diseases, are some of the areas on which researchers belonging to different disciplinary backgrounds should pay serious attention. Such studies from different regions of the country based on even larger samples can perhaps yield results with effective policy implications. Such studies would also be helpful in preparing a strong epidemiological data base in the country.

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