Health Inequality in Forest and Non-Forest Areas: A Comparative Study in Kokrajhar District of Assamin terms of Disease Incidences and Health Facilities

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Abstract: As the Health for All programming goal of the World Health Organization is gaining popularity around the world, the health inequality has risen up as a burning topic of research in the field of health studies. Since the goal cannot be achieved without eradicating the health disparities among different sections of the people, researchers are trying to find out the ways and means for the purpose. The plainly observed health disparity between the populations of forward area and remote area has been identified as one of the obstacle in meeting the goal.

An attempt has been made through this study to study the health inequality in forest and non-forest areas of Kokrajhar district of Assam in India in terms of disease incidence and distribution of health facilities there, through analysis of secondary data obtained from relevant sources. In this connection, the analysis conducted on incidences of prevalent diseases in the forest area and non-forest area of the districtduring the period 2010-2016 did not find significant differences in their occurrences in the two areas. On the other hand, analysis of seventeen years' data on malaria incidences over the period from 2000 to 2016 revealed statistically significant differences in API and SPR of malaria in forest area and non-forest area of the district (at 5% significance level). However, both forest and non-forest malaria, currently, are found to have declining trends.Another analysis on spatial distribution of health care institutions in forest and non-forest areas of the district and available manpower therein, revealed notable disparities in both the matters.Both in quantity and standards, forest area health institutions were found to be poorer than that of the non-forest area. Although health institutions in non-forest area are also not of desired and requisite standard, these are in much better condition than that of the forest area, while the later are deplorably functioning. Despite of continued national health programme, under the name and style of National Rural Health Mission (currently National Health Mission), 80% health institutions of the district (75% in forest and 83% in non-forest area) are functioning in substandard mode when referred to the standard prescribed by the national health authority.

Key words- Forest area, health inequality, health services, non-forest area, primary health centre, rural health care

1. Introduction

Eradication of inequality in health among different sections of the people has become key agenda of the world society nowadays. It has been well perceived that establishing equality in health is possible only through removal of root drivers of health inequality.WHO identifies following features as the drivers of health inequity in international context.

1) Unequal distribution of the benefits of the economic growth
2) A net financial outflow from poorer to richer countries that has been resulted due to inadequate international flows of aid to the poor countries.
3) A declining share in national consumption.
4) Gender biases in power, resources, entitlements, norms and values.
5) Lack of empowerment of individuals to challenge and change the unfair and steeply graded distribution of social resources to which everyone has equal claims and rights.

However, in regional context, the drivers of health inequality are seemed to vary region by region. The regional diversity in terms of social and economic status contributes towards surfacing of health inequality among the people of the society.

1.1 Social determinants of health and health inequality between societies

The circumstances, in which people are born, grow up, live, work and age, and the systems put in place to deal with illness are termed as social determinants of health. The social determinants of health are shaped by economics, social policies, cultural and environmental conditions, and politics prevailing in the society; and

therefore, the risk of illness of people and the preventive measures in regard to illness or treating an illness is seen to vary along with social and economic conditions of the respective people [1]. This variation causes differences in health status or in the distribution of health resources between different population groups. An association between health and social class has been observed around the globe since early times. Over the years there has been notable improvement in health in all sections of societies; measures have been undertaken to eradicate health inequalities; but this discrepancy is still prevalent in the societies.

India, the mini world, being a multi-cultural, multi-ethnic, multi-lingual society with pluralistic health system, is susceptible to health inequality [2]. India, ranked 131 on Human Development Index in 2015 ranking, had to forfeit 27 % of its score due to regional disparities in education, health parameters and living standards within the country [3]. The inequality in health status and inequity in accessing health resources are predominant features of various societies in India. The high rate of maternal mortality and low rate of institutional delivery are indicators of inaccessibility of healthcare facility in India. Due to its inaccessibility, the modern medicines are sometimes found as an unfeasible option for a large section of the population living in remote areas [4]. Socio-economic determinants, such as poverty, social exclusion and gender discrimination are playing the role of retarding forces in adopting health policies.

The uneven distribution of health facilities is sponsoring health inequality in India. The existence of a huge workforce shortage in health sector has added more strain in this regard. The health workers are more inclined towards the urban area than rural area in extending their services. This is the outcome of the circumstance that major portion of the incoming doctors hail from towns and cities and belong to upper and middle castes; considerable size of them being from very rich family[5].

Despite of worth mentioning effort of the Government to diminish the disparity in the distribution of health facilities through various health programs, establishing health equality in the country still remains as a distant dream for India. The current health program National Health Mission, although penetrating the remote area for enhancement of health facilities in rural areas, it has not been able to achieve even 50% of its target[6]. Due to shortage of ambulances, carrying the patients of rural areas on bullock or horse cart for their treatment to the hospitals, still remains as a regular phenomenon in India. Some analyst even sees its trend to decline towards the failure zone [7].

A study by Krycia Cowling et. al [8] identified some social determinants of health and suggested for new or improved national policies along with evaluation of existing national policies in these areas. Sarkar, in his editorial note of 2016 International Journal of Medicine and Public Health, opined that India has not been able to reduce the wide disparities in health between different sections of the population and between different regions of the country[9].

1.2National Health care system in India

In order to deliver health care services to the people, in India, public health care hasbeen organized at following three levels-

1. Central level
2. Intermediate level, and
3. Primary level

The central level institutions for delivery of health care are mainly comprised of regional hospitals, medical college hospitals and specialized hospitals, which are usually located in the urban areas.

In the second level there exists sub divisional and district hospitals, which provides support to the primary health care institutions. In this level of health institutions, a morecomplex problems compared to the primary level are dealt with.

The third level, that is the primary level, is most concerned withthe rural areas. It is the main organ that deals with delivery of health care in the rural areas. Health institutions of this level are the points of contact between individualsand the health system. Taking the purpose and service of the primary level of the health care system into account, it is alsocalled as rural health care system[10].

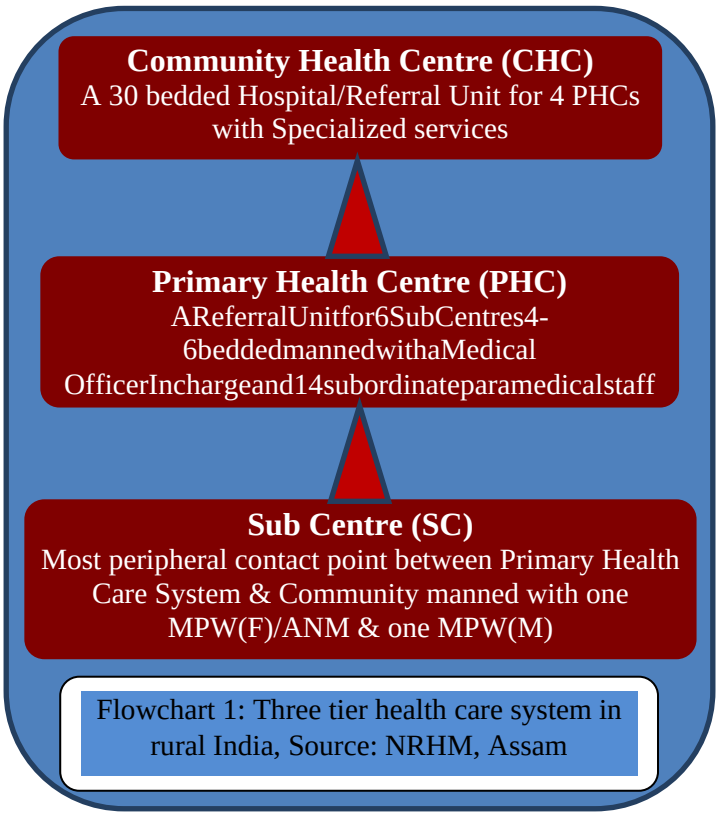
1.3 Rural health care system in India and structure of public health care system

The rural health care delivery system of India comprises three major types of health care- the public health system, theprivate health system, and the traditional health care system. Private health system is mainly a phenomenon in urban area, which provides health care to the people in a more convenient way, but at higher cost. On the other hand, traditional system of health care is inevitable in the areas where there are scarce of preceding

two health care systems or non-existent of them. However,nowadays, the public health care system constitutes the prime source of healthdelivery system in India.

The health care infrastructure in rural areas of India has been developed as a three tier system, as shown in Flowchart-1, viz.,

1. Sub Centre
2. Primary Health Centre, and
3. Community Health Centre



Flowchart 1: Three tier health care system in rural India, Source: NRHM, Assam

The Sub-Centre (SC) is the first contact point between the primary healthcare system and the community. They are assigned tasks relating to interpersonal communication in order to bring aboutbehavioural change. Further, they are entrusted with the responsibility of providing services in relation to maternal and child health, family welfare,nutrition, immunization, diarrhoea control and control of communicable diseases programmes. Equipped with basic drugsneeded for taking care ofessential health needs of men, women and children, these can provide treatment to minor ailments.

On the other hand, Primary Health Centre (PHC) stands as the first contact point between village community and the Medical Officer. Theseare envisaged to provide an integrated curative and preventive health care to the ruralpopulation, laying emphasis on preventive and promotive aspects of health care [11].

The third tier of the network of rural health care institutions, the Community Health Centres (CHC),are designed toprovide referral as well as specialist health care to therural population from the neighbouring PHCs, usually four (4) in number, for the patients requiring specialised health care services. There is two-fold objective of having a referral centre for the primary health care institutions- first, to make modern health care servicesaccessible to the rural people, and second, to ease the overcrowding in the district hospitals.

The health institutions, Sub Centre, Primary Health Centre and Community Health Centre, are established by the State Governments following some population and staffing norms framed at national level by the Directorate General of Health Services with objectives to provide basic primary health careservices to the community and achieve and maintain anacceptable standard of quality of care. These prescribed norms are known as Indian Public Health Standards (IPHS), which are expected to help monitor and improve functioning of the health institutions at different level.

1.4 Population norms for health centres

Following are the population norms to be followed in establishing different types of health centres.

Table 1: Population norms for health centres

HealthCentre	Population Norms	
	Plain Area	Hilly/Tribal/Difficult Area
Sub-Centre	5000	3000
Primary Health Centre	30,000	20,000
Community Health Centre	1,20,000	80,000

Since the rural area of the district is dominated by Schedule Tribe population, the IPHS norms for Tribal area are applicable for all health institutions of the district.

1.5 Staffing norms for health centres

As per IPHS, minimum norm of staffing pattern of health centres at different level are to as below[12a, 12b,12c].

Table 2: IPHS for staffing pattern of health centres at different levels

A. STAFF FOR SUB – CENTRE / Number of Posts 1. Health Worker (Female)/ANM / 1 2. Additional Second ANM (on contract) / 1 3. Health Worker (Male) / 1 4. Voluntary Worker /1 Total (excluding contractual staff): 3	C. STAFF FOR COMMUNITY HEALTH CENTRE: 1. Medical Officer #/ 4 2. Nurse Mid– Wife(staff Nurse) / 7 3. Dresser / 1 4. Pharmacist/Compounder / 1 5. Laboratory Technician / 1 6. Radiographer / 1 7. Ward Boys / 2 8. Dhobi / 1 9. Sweepers / 3 10. Mali / 1 11. Chowkidar / 1 12. Aya / 1 13. Peon / 1 Total: 25 #:Either qualified or specially trained to work as Surgeon, Obstetrician, Physician and Paediatrician. One of the existing Medical Officers similarly should be either qualified or specially trained in Public Health).
B. STAFF FOR NEW PRIMARY HEALTH CENTRE 1. Medical Officer / 1 2. Pharmacist / 1 3. (i) Nurse Mid-wife (Staff Nurse) / 1 (ii) Additional Staff Nurses on contract / 2 4. Health Worker (Female)/ANM / 1 5. Health Educator / 1 6 Health Assistant (Male) / 1 7. Health Assistant (Female)/LHV / 1 8. Upper Division Clerk / 1 9. Lower Division Clerk / 1 10. Laboratory Technician / 1 11. Driver (Subject to availability of Vehicle) / 1 12. Class IV / 4 Total (excluding contractual staff): 15	

1.6 Three tier structure of health care system in Assam

Following the national policy of providing health services to the community through three tier system Assam has also adopted and implemented the same system for health services in the state. Under each district of the state there is one sub divisionalhealth centre or one civil hospital as referral units. For rural healthserviceseach district has been divided into some blocks as per specified population norms, which are called Block Primary HealthCentre (BPHC). Under each blockprimary health centre, there are Community Health Centres as per the existing population norms. In the second line there are some PHCs under each CHC. Besides PHCs, there are some other health institutionsunder CHC such as subsidiary health centre (SHC), char primaryhealth centre (Char PHC), state dispensary (SD), mini primary healthcentre (MPHC); all of which are at par with a PHC. These health institutions with different names exist because during the time of adoption of the national health service policy some of these health institutions were already in existence. Perhaps, in due course of time these health institutions have been upgraded with better facilities to make them equivalent to a new PHC. BPHCs are the administrative headquartersfor all CHCs, PHCs and sub centres.

1.7 Study area

Kokrajhar is one of the twenty-seven districts of Assam state of Indian union.The Report of the Task Force on "Identification of Districts for Wage and Self-employment programmes", Planning Commission, 2003 enlisted it as a backward district placing it in 59th rank among the backward districts in India.Major portion of this socially and demographically backward district is covered by the notified forest area, which has acquired an atypical distribution of the villages within it.The villages which were established by Forest Department or recognized by it are known as Forest Villages. Besides forest villages there exists other settlement areas too. The villages are scattered and communication is very much deplorable.Majority of the people residing in the forest area are from Scheduled Tribe community.As per the Economic census, 2001-02, as much as 75% of the families residing within the forest area are leading their life below poverty line.Their financially backwardness keeps them busy in arranging two square meals for the day, as a consequence of which they remain disconnected from the outside world. They are hesitant to approach concerned authorities for their health and other problems as they are illiterates and consider themselves inferior to other advanced people.

There exists a contiguous forest area along the northern tract of the district.This contiguous forest area is distributed over two forest divisions, namely Haltugaon Forest Division and Kachugaon Forest Division.For the present study, this contiguous forest area has been defined as the forest area, leading to term the area outside it to be non-forest area.

1.8 Medical Blocks of the district

Kokrajhar district comprises four medical blocks, namely Balajan Block, Dotma Block, Kachugaon Block and Gossaigaon. Block Almost whole part of the Kachugaon Block lies within the notified forest area. Within the contiguous forest area along northern track of the district some more health institutions of the middle level, such as PHC, MPHC, SHC, SDare available. Accordingly, the forest area contains good numbersSub Health Centres, the most peripheral to the community, of the district.

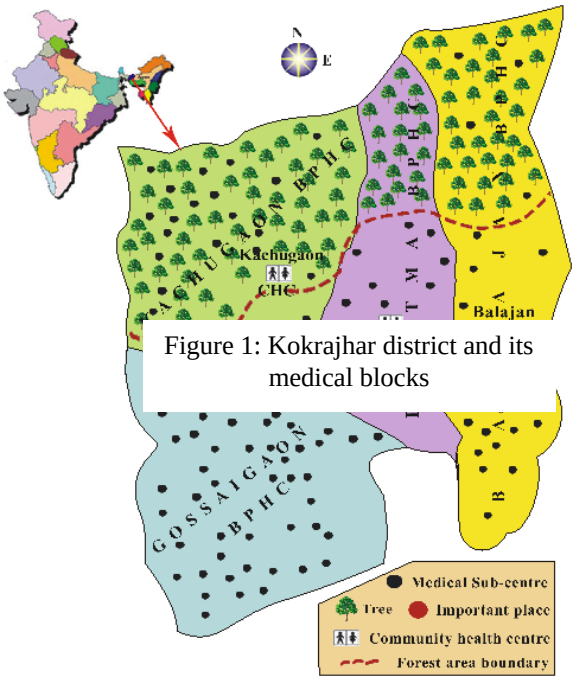


Figure 1: Kokrajhar district and its medical blocks

2. Aims and objectives

The study aims at investigating the occurrence of different diseases in the forest and non-forest areas of the district.The cases of different diseasesoccurred during the period of last one decade in the forest area and the non-forest area of the district would be estimated and then finally effort will be made to compare the maladies in the two areas.Further, it is also intended to survey the health facility distribution in the forest and non-forest areas and then to examine if there exists disproportionality in the distribution of health facilities in the two areas.

In order tomaterialize the above mentioned aims it is intended to use the district level Integrated Disease Surveillance Reports of Integrated Disease Surveillance Programme under Ministry of Health & Family Welfare, Govt. of India. In addition to this, the monthly reports of National Vector Borne Disease Control Programme on malaria incidences has also been considered for the purpose.

3. Materials and methods

Monthly district level Integrated Disease Surveillance Reports of the last ten years were collected from the Kokrajhar Unit of Integrated Disease Surveillance Programme. The reports were not available for some months. Data were entered into SPSS 24 worksheet and then unavailable values were estimated by interpolating the missing values of the entered data. Then year wise cases of different diseases were estimated block wise. The disease situation in Kachugaon Block Primary Health Centre has been considered to be the disease situation of the forest area of the district. The district has been divided into three areas, viz. Forest village area, Forest area and Non-forest area vide following definitions-

Forest village area: - area constituted by forest villages

Forest area : - area constituted by notified forest area and its fringe area

Non-forest area : - area outside forest area

Evidently, forest area includes forest village area.

For the situation analysis of malaria, the data on epidemiologicalsituation reports supplied by National Vector BorneDisease Control Programme (NVBDCP), Kokrajhar district,for the period 2000–2017, has been considered and malariaindicators for different years have been calculated for all thefour medical blocks.

For analysis on health facility distribution the district report on Rural Health Statistics (RHS), 2016 has been considered. Distribution of health facilities in forest villages, forest area and non-forest area were extracted from the data, and then analysis were carried out.

4. Results and Discussion

4.1Prevalent diseases of the district and their block wise incidence

From the IDSP monthly surveillance report following diseases are found to be prevalent in the district-

1. Acute Diarrhoeal Disease
2. Bacillary Dysentery
3. Enteric Fever
4. Acute Respiratory Infection, and
5. Pneumonia

Following Charts 1, 2, 3, 4 and 5 show the block wise incidences of above five diseases during the last seven years from 2010 to 2016.

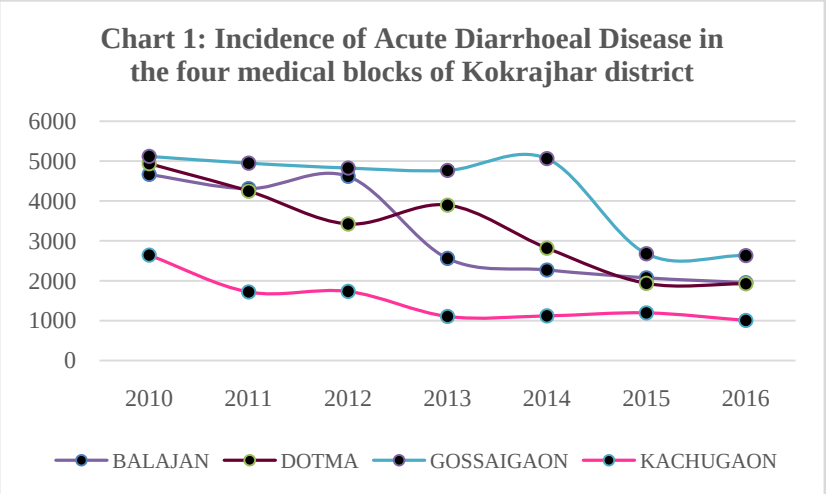


Chart 1: Incidence of Acute Diarrhoeal Disease in the four medical blocks of Kokrajhar district
6000
5000
4000
3000
2000
1000
0
2010
2011
2012
2013
2014
2015
2016
BALAJAN
DOTMA
GOSSAIGAON
KACHUGAON

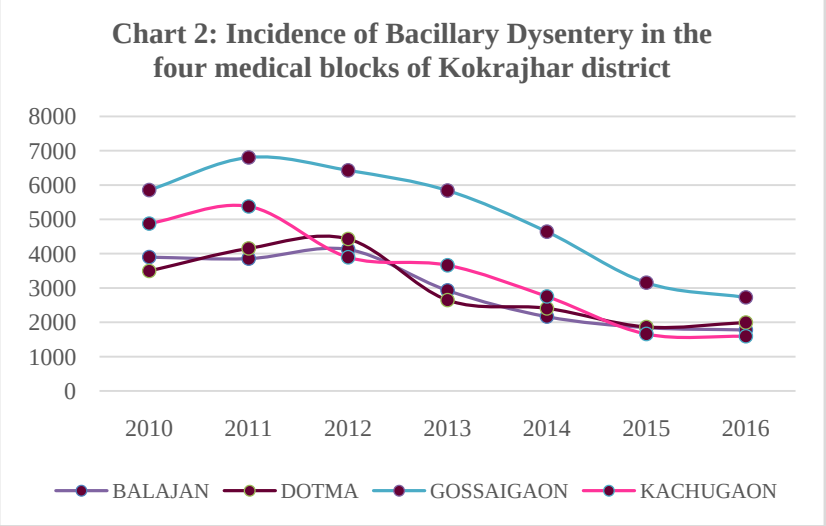


Chart 2: Incidence of Bacillary Dysentery in the four medical blocks of Kokrajhar district
8000
7000
6000
5000
4000
3000
2000
1000
0
2010
2011
2012
2013
2014
2015
2016
BALAJAN
DOTMA
GOSSAIGAON
KACHUGAON

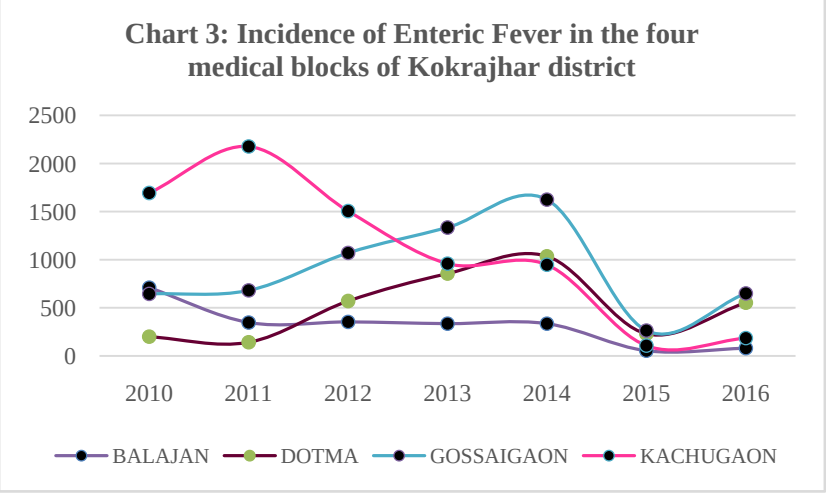
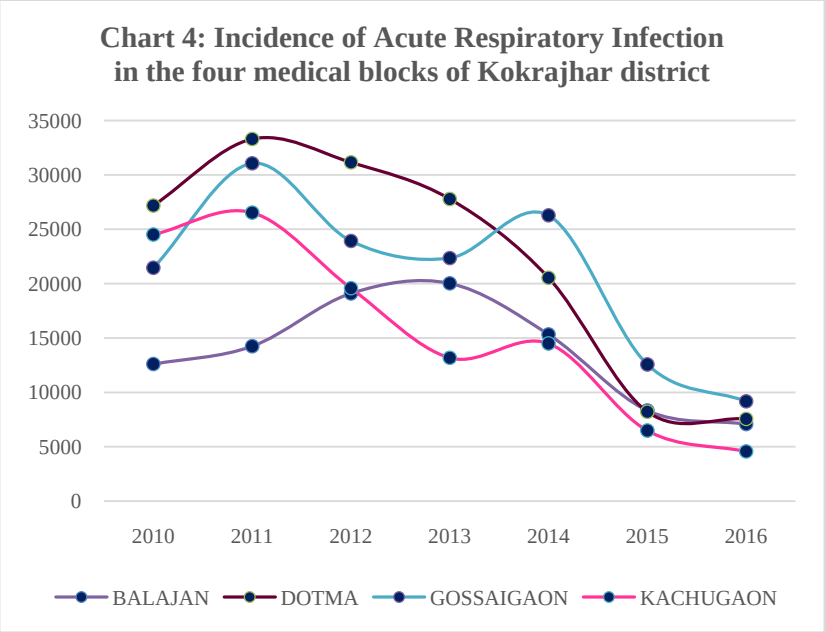
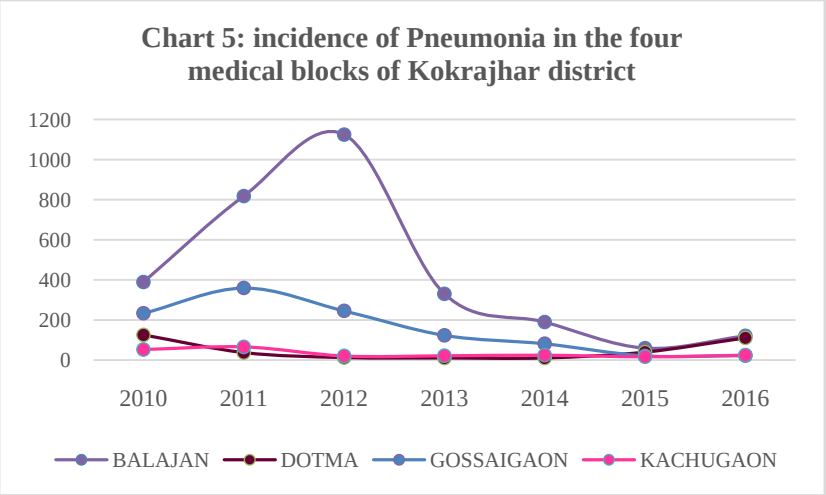


Chart 3: Incidence of Enteric Fever in the four medical blocks of Kokrajhar district
2500
2000
1500
1000
500
0
2010
2011
2012
2013
2014
2015
2016
BALAJAN
DOTMA
GOSSAIGAON
KACHUGAON





Throughout the period 2010-2016, the Kachugaon block received fewer cases of Acute Diarrhoeal Disease(including acute gastroenteritis) than other three blocks. The incidences of diseases have got a declining trend in all the four medical blocks.

During the period the Kachugaon block followed the Gossaigaon block in respect of Bacillary Dysentery incidence. There can be seen an almost proportionate decline in the incidence of this disease in all four medical blocks.

In the beginning of the period, the Kachugaon block witnessed higher incidence of Enteric Fever than all other three blocks, but towards the end it received lower cases than others. In all the four blocks, incidences of the fever have got overall declining trends.

In the beginning of the period the Kachugaon block received high incidences of Acute Respiratory Infection, next to Dotma, but towards the end the incidence of the disease has notably reduced so as to occupy the bottom position among the four blocks. Incidences of this disease in all the four medical blocks have declining trends.

During the period occurrence of Pneumonia in the Kachugaon block remained below the incidences of other four blocks. Although the incidences are low, the fever is seen to maintain steadiness in all the four blocks, except a sharp declination in Dotma block.

From this study on incidences of different prevalent diseases in forest and non-forest areas of the district it may be observed that the forest is not contributing towards occurrence of these diseases, there prevails the same situation in both forest and non-forest areas in regard to occurrence of these diseases.

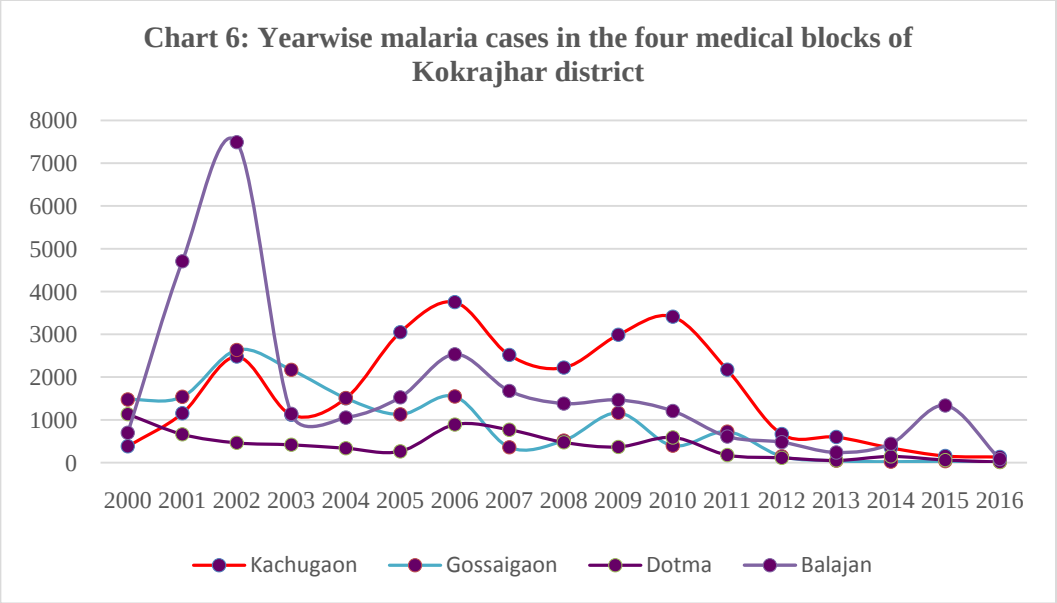
4.2 Malaria disease in Kokrajhar district

There was prevalence of different endemic diseases in the district in the past for a long time [13]. Kala-azar, usedto sweep through the district killing thousands of peoplein the twenties of the 20th Century [13]; but it exists no longer in the district. Other vector-borne diseases are also very rare in the district. Butmalaria still remains to be endemic in the district and createshavoc among the masses[14].

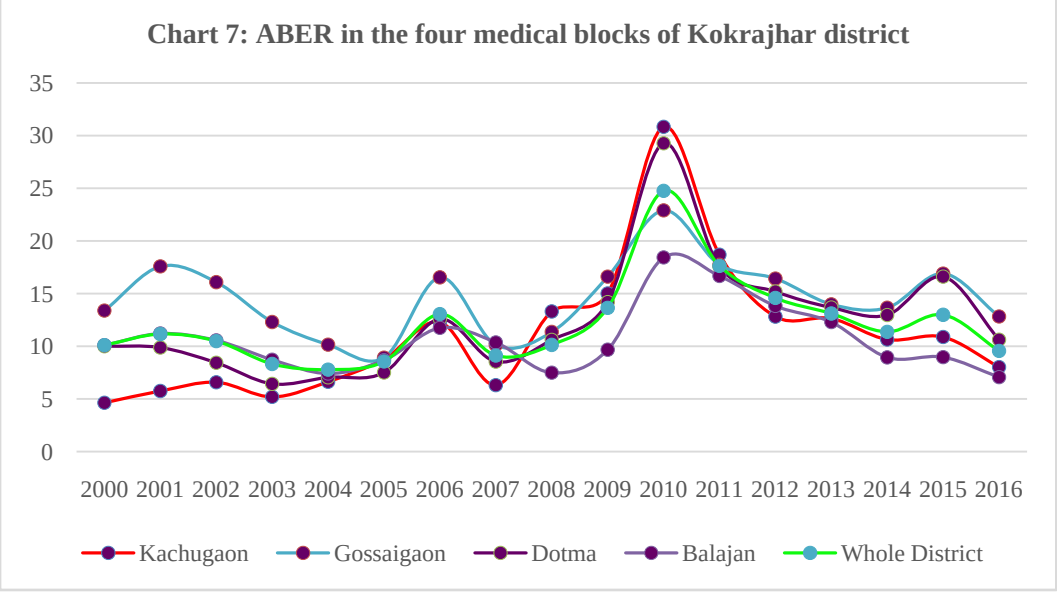
The district has a moderate variation of temperatureranging 22◦C to 32◦ C, January and August being the coldestand the hottest months, respectively. Thedistrict has got a high annual rainfall of 18626mm and ahigh humidity of 73.5 on average [14]. These together give rise a favourable condition for transmission of malaria thatsubsists in the district throughout the year. Thus,malaria disease occurs in the district throughout the year,the monsoon season, fromMay to September, being the pickperiod of the disease [15].

Analysis of the malaria incidence data supplied by National Vector Borne Disease Control Programme for the last seventeen years from 2000 to 2016 shows that the Kachugaon medical block, which lies within forest area almost completely, is more vulnerable to malaria than other three blocks of the district.All the malaria indicators indicate the deplorable situation in Kachugaon block in respect to occurrence of malaria.

Charts 6, 7, 8, 9, 10 show the Malaria incidences in the four blocks, the Annual Blood Examination Rate (ABER), the Annual Parasite incidence (API), the Slide Positivity Rate (SPR) of the four medical blocks during the period 2000-2016.



There was a malaria endemic in 2001 and 2002 in Balagaon block, during which two years the annual malaria incidence of the block rose higher than that of the Kachugaon block. For other years, the malaria cases in the Kachugaon block remained higher than that of other blocks. Towards the end of the period the malaria incidence in Kachugao block is found to decline faster than other blocks. In the year 2016, the malaria incidence in all blocks significantly declined, when incidence in all blocks remained below 100 cases.



In most of the years of the period from 2000 to 2016, the Annual Blood Examination Rate (ABER) of Kachugaon Block remained below that of the district. It ranged from 4.64 to 30.82. The blockachieved the highest ABER in 2010 when it rose up above the district ABER (24.75).Medians of Kachugaon, Gossaigaon, Dotma, Balajan blocks ABER and that of the whole district stood at 10.64, 13.98, 10.63, 10.10, 11.16 respectively.

Chart 8: Malaria API in the four medical blocks of Kokrajhar district

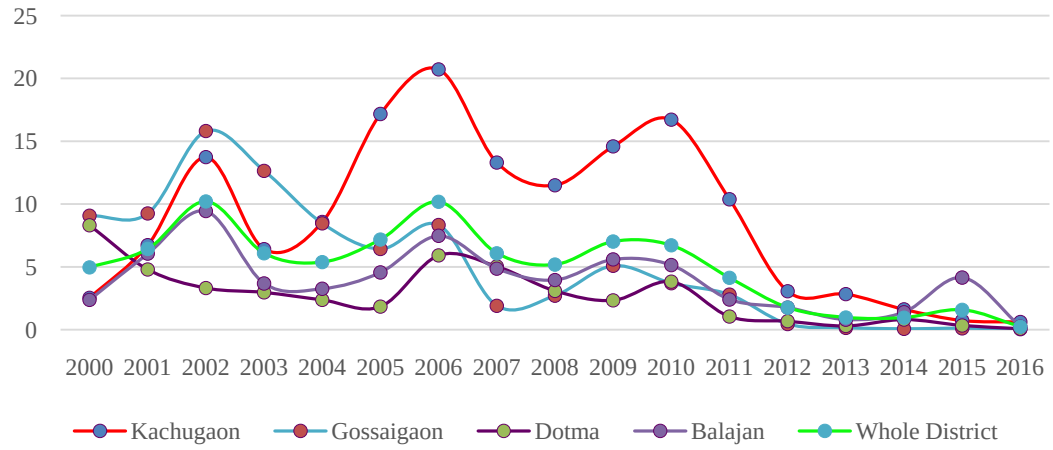
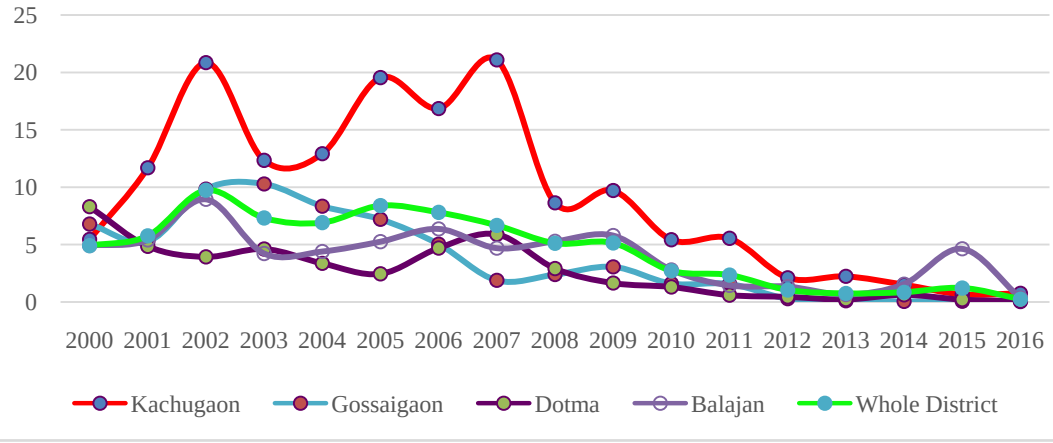


Chart 9: Slide Positivity Rate of the four medical blocks of Kokrajhar district



Except for the years 2000 and 2015, the API of the Kachugaon block remained higher than the district API. In most of the years the Kachugaon API exceeded API of the other three blocks. Medians of APIs of Kachugaon, Gossaigaon, Dotma, Balajan blocks and that of the whole district stood at 8.57, 3.70, 2.37, 3.95, 5.38. Towards the end of the period, there was sharp decline in the API of Kachugaon block. APIs of all blocks have declining trend.

ABER indicates the population coverage for blood examination for malaria. Higher the ABER, higher the coverage. On the other hand, API indicates the positivity rate of the examined cases. Therefore, for a better malaria situation it is expected to have high ABER followed by low API. But in Kachugaon medical block there can be seen higher API for lower ABER, apprehending even higher API in the block had there been higher ABER.

Mann Whitney U test indicated that API of Kachugaon block was significantly different from the APIs of Dotma (p= 0.004 at 5% significance level) and Balajan (p= 0.038 at 5% significance level) blocks, however, the same was significant from the API of Gossaigaon block at 10% significance level (p= 0.057) only.

On the other hand, SPR indicates the prevalence of the malaria disease. The mean SPRs of Kachugaon, Gossaigaon, Dotma, Balajan blocks and that of the whole district come out as 9.25%, 3.75%, 2.71%, 4.00% and 4.52% respectively, showing awful malaria situation in Kachugaon block in comparison to other blocks of the district.

Mann Whitney U test indicated that the SPR of Kachugaon was significantly different from SPRs of all other three blocks(for Gossaigaon, p= 0.013, for Dotma, p= 0.002 and for Balajan, p= 0.020, all at 5% significance level).

However, the SPRs of all blocks are declining at fast rate, and for the last three consecutive years, no medical block had attained SPR greater than 5% continuously. Hence, all medical blocks of the district are outside malaria high-risk area as per the criteria ofMalaria Action Programme of the country [16, 17],

4.3Health facilities of Kokrajhar district

The block wise distribution of different types of health institutions of the district is as below.

Table 3: Block wise distribution of health institutions in Kokrajhar district

Name of health block	No of CHC	No of PHC/MPHC/SHC/SD	No of SC	Population covered
Balajan	1	12	34	178116
Dotma	1	14	30	95760
Gossaigaom	1	11	59	222036
Kachugaon	1	08	38	175507

4.4 Area wise distribution of health facilities

Following is the area wise, viz. Forest villages, Forest area and Non-forest area distribution of health facilities in Kokrajhar district.

Table 4: Distribution of health facilities in forest villages, forest area and non-forest area

Name of area	No. of BPHC	No of CHC	No of PHC/MPHC /SHC/SD	No of SC	Population covered
Forest villages	0	0	4	29	134855
Forest area	1	1	12	64	281939
Non-forest	3	3	33	59	389480

4.5 Distribution of Sub Centres

Distribution of SCs in the forest villages, forest area and non-forest area of the district are as below.

Table 5: Distribution of Population, SC and ASHA in forest villages, forest area and non-forest areas

Area	No. of SCs	No. of villages	Average no. of villages per SC	Population covered	No. of ASHA	Population per ASHA
Forest villages	29	214	8	134855	220	613
Forest area	64	443	7	416794	419	995
Non-forest area	97	567	6	389480	528	738

Out of 140 forest villages available in the district, there are 29 SCs, each of which covers eight villages in average. When entire forest area is considered, the average number of villages covered by an SC diminishes by one; for non-forest area this number again reduces by a village. In regard to appointment of ASHA, the guideline tells to lay emphasize on spatial distribution of habitations, not on population (which is one ASHA for 1000 population for tribal area) (NRHM guidelines), which seems to be followed in case of forest villages (220 ASHAs for 214 villages). But when entire forest area is considered it is seen to deviate from this guideline; non-forest area has been provided better coverage in regard to ASHA than forest area.

Table 6: Manpower available in the SCs of forest villages, forest area and non-forest area

Area	RHP[a]		ANM[b]			MPW[c](M)		
	Sanctioned	In position	Sanctioned	In position	Population per ANM	Sanctioned	In position	Population per MPW
Forest villages	3	7	16	41	3290	8	13	10373
Forest area	5	11	28	91	4581	14	33	12630
Non-forest area	28	12	100	130	2996	50	64	6086

a- Rural Health Practitioner, b-Auxiliary Nurse Midwife, c-Multi Purpose worker

All the SCs in the district, irrespective of forest area and non-forest area, have got very poor manpower. Even the small number of scanty sanctioned posts of RHP are not filled up.Since, as per the population norm,there should be at least one ANM for 3000 populations in tribal area, there is inadequate number of ANM in the forest area. In regard to availability of MPW, the condition is appalling one as as many as 64 SCs, 31 in the forest area and 33 in the non-forest area, are functioning without an MPW(M), who are supposed to provide preliminary treatment to the people including malaria, which is prevalent in the district.

4.6 Distribution of PHC rank health institutions

Following table gives the distribution of PHC, MPHC, SHC and SD, which are of equivalent rank in Assam, in the district.

Table 7: Distribution of PHC rank health institutions in forest villages, forest area and non-forest area

Area	Total no. of PHC/MPHC/SD/SHC	Population covered	Average population covered by a HI	No. HI fulfilling IPHS norms	No. of HI functioning as FRU	No. of HI functioning as 24×7SDC*
Forest villages	4	99510	24878	0	0	3
Forest area	12	186212	15518	3	0	4
Non-forest area	33	260408	7891	6	0	14

*Services Delivery Centre

There can be seen much better provision of health services delivery centres in the non-forest area than in forest area. Although the population norm form for PHC in tribal area (one PHC for 20000 population) has been fulfilled in forest area, the same has not been done in forest villages. No health institution in forest villages is functioning fulfilling the IPHS norms; out of twelve health institutions of forest area, only three are running as per IPHS norms. In this regard, health institutions in non-forest area are also not in a better position, as only 18% of the health institutions, available in the it, are functioning as per IPHS norms. Regrettably no health institution of the PHC rank is functioning as First Referral Unit, although, as per IPHS norms, these are expected to act as FRU for 6 Sub-Centres andrefer out cases to CHC (30 bedded hospital) and higherorder public hospitals located at sub-district and district level. Although these institutions are required to be 24×7 Services Delivery Centre majority of them have failed to do so.

4.6.1 Availability of beds in different wards in the health centres

Availability of beds in different wards in different health institutions of the forest area and non-forest area of the district is as shown in Table 8.

Table 8: Available beds in the PHC rank health institutions in forest villages, forest area and non-forest area

Area	Antenatal ward		Post Natal ward		Eclampsia Ward		Paed. Ward	Med. ward	Surg. ward	Eye ward	ENT ward	Isol. Ward	Other ward		Total bed	Avg. no. of bed per HI
	Nhiwa	NoB	Nhiwa	NoB	Nhiwa	NoB							Nhiwa	NoB		
Forest villages	1	1	4	13	3	18	NA	NA	NA	NA	NA	0	0	0	32	>6
Forest area	7	12	6	18	4	24	NA	NA	NA	NA	NA	0	2	2	56	<6
Non-forest area	21	30	16	28	3	18	NA	NA	NA	NA	NA	1	11	32	120	<6

Nhiwa- No. of health institutions where available, NoB- No. of Beds, Paed.- Paediatric, Surg.- Surgical, NA-Not available, Isol.- Isolation, Avg.- Average

Only one health centre in the forest villages has Antenatal ward, which is vital for maternal care. Similarly, major number of health centres in both forest and non-forest areas are functioning without antenatal ward. None of the health centres in the rank of PHC possesses some vital wards viz. Paediatric Ward, Medicine ward, Surgical ward, Eye ward andENT ward. The numbers of health institutions in forest villages, forest area and non-forest area that possess less than six (6) bed, the number prescribed by IPHS for a health institution of PHC rank, are respectively 1, 7 and 23.

4.6.2 Status of essential services in PHCs

Table 9 shows the status of essential services to be available in the PHC ranked health centres.

Table 9: Status of essential services in forest villages, forest area and non-forest area

Area	Laboratory		Operation Theatre		Labor Room		New Born CC		Doctor Quarter		Ref. Transport	
	Avail.	Funct.	Avail.	Funct.	Avail.	Funct.	Avail.	Funct.	Avail.	Living	Avail.	NA
Forest villages	4	4	0	0	4	3	4	4	4	3	3	1
Forest area	11	11	0	0	12	11	12	7	12	7	6	6
Non-forest area	21	20	1	0	29	29	23	19	28	13	12	21

Avail.- Available, Funct.- Functional, CC- Care Corner, Ref.- Referral

Out of forty-five PHC ranked health centres in the district, there exists only one health centre which has an operation theatre, which lies in non-forest area, but that is also non-functional. Thus there does not exist a PHC ranked health centre in the entire forest area having an operation theatre, functional or non-functional. Although majority of the PHCs have functional Laboratory, considerable number of health centres, both in forest and non-forest areas, are functioning without any laboratory. Same is the case with Labour Room and New Born Care Corner also. Although almost all health institutions are having Doctor's Quarter, doctors are living in 50% of them only.

4.6.3 Staff positions in health centres

Staff positions of different health centres of the district are as in Table 10A and 10B.

Table 10A: Area wise manpower of the health centres

Area	Allopathic Doctor		Medical Officer (Ayur)		Medical Officer (Homeo)		Female Doctor		Block Extension Educator		Statistical Assistant for MIS	
	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position
Forest villages	1	0	1	4	0	1	0	0	0	1	0	0
Forest area	6	4	4	6	2	1	2	0	0	1	0	0
Non-forest area	35	12	23	13	11	2	10	2	1	2	2	3

Table 10B: Area wise manpower of the health centres

Pharmacist		Lab Technician		Health Educator		Health Assistant (M)		Health Assistant (F) / LHV		Health Worker (F) / ANM		Nurse Midwife / Staff Nurse	
Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position
1	3	1	3	1	1	1	0	1	0	2	4	3	10
4	10	4	10	4	1	4	3	3	0	8	8	12	15
26	42	25	23	25	10	25	12	20	4	52	50	59	35

In the four PHC ranked health centres, only one centre has got a sanctioned post of allopathic doctor, and currently there is no doctor against this post. Out of twelve health centres lying within forest area, there are no sanctioned post of allopathic doctor in as many as eight centres, and eight centres are running without any allopathic doctor. As per non-forest area is concerned, out of thirty-five health centres of PHC rank, seven centres have no sanctioned post of allopathic doctor and currently twenty-three centres are running without an allopathic doctor.

In the PHC ranked health centres, ayush doctors are more available than allopathic doctors in forest area. In the forest villages, all centres are being run by ayush doctors, while in the entire forest area, 60% of available doctors are from ayush. In non-forest area the situation is improved a little where allopathic doctors constitute 52.27% of the available doctors.

In forest area, four centres (33.33%) are running without any doctor, allopathic or ayush, while in non-forest areaas many as thirteen health centres (33.39%) are running without a doctor.

While as per IPHS norms there should be minimum ten (10) staff members of rank higher than IV, in forest area eleven centres (91.67%) have got staff strength (higher than Grade-IV) less than it and there is not a single sanctioned post of such rank in as many as eight health centres (66.66%). As per non-forest area is concerned, there are no sanctioned post of such rank in eleven centres (33.33%) and in twenty-eight centres (84.85%) the staff strength of such rank is less than ten (10).

4.7Distribution of CHCsin the district

There at four Community Health Centres in Kokrajhar district, namely, Balajan, Dotma, Bashbari and Kachugaon.Three out of these four CHCs, namely Balajan, Dotma and Kachugaon are situated at BPHC headquarters. The Kachugaon CHC lies within the forest area.The Balajan and Bashbari CHCs are attached to Balajan BPHC and Bashbari SD respectively, and currently both are non-functional.

The Kachugaon centre covers a population of 158834, which is approximately as twice as the population prescribed by IPHS for tribal area, the populations covered by other three centres, namely Balajan, Dotma and Bashbari, are respectively 21887, 78445 and 67385, all of which are within the prescribed population limit.

Although both the functional CHCs are functioning as 24×7 Service Delivery Centre, neither both of them has meet the IPHS norms nor function as FRU. Blood Storage Facility is not available in all the four CHCs. Only the Kachugaon centre has the facility of emergency obstetric services.

Kachugaon centre, the only CHC within the forest area, has only three wards, namely Antenatal, Post Natal and Paediatric Wards with 15 beds in total. Great inconveniences are there in the centre due to non-availability of any medicine ward, male or female and Eclampsia Ward.On the other hand, all other three CHCs, which are in non-forest area, have both male and female medicine wards, with 30 beds each; but none of them possesses paediatric ward. None of the health centre of the district possesses Surgical, Eye, ENT and TB Wards.

Only Kachugaon and Dotma centres have got Operation Theatre; meanwhile all centres have got functional Laboratory, Labor Room, New Born care corner and referral transports. Although three centres in the non-forest area have Stabilization Units for New Born, Kachugaon centre does not possess it. No centre has functional X-Ray machine. Though Kachugaon centre has Quarter for Specialist Doctors, doctors are not staying there.

4.7.1 Staff position in CHCs

Following Table 11A gives the numbers of sanctioned posts in different branches / sections in four CHCs of the district.

Table 11A: Specialist and Nursing Staff position in CHCs

CHC	Surgeons		Obstetricians/ Gynecologist		Physicians		Paediatricians		Public Health Nurse / ANM		Staff Nurse / Nurse Midwife	
	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position
Kachugaon	0	0	0	1	0	0	0	0	0	1	0	7
Dotma	1	0	1	0	1	0	1	0	4	5	4	9
Balajan	0	0	0	0	0	0	0	0	0	0	0	0
Bashbari	0	0	0	0	0	0	0	0	0	0	0	0

The Kachugaon CHC is lack of sanctioned posts of essential specialists require in order to provide quality health services to the community. For most specialised sections of the centre such as Surgeons, Obstetricians, Gynaecology, Paediatric, General Medicine, Public Health Nurse, Staff Nurse it has not been accorded any sanctioned post. In comparison to the situation of Kachugaon CHC, situation in Dotma CHC is much improved. It has acquired some essential sanctioned posts in specialised sections. Both in terms of sanctioned posts and in position of specialised staff, Dotma is much developed one.

Table 11B: Subsidiary manpower in CHCs(I)

CHC	Anaesthetist		Eye Surgeon		Public Health Programme Manager		General Duty MO Allopathic		General Duty MO (Ayur)		General Duty MO (Homeo)	
	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position
Kachugaon	0	0	0	0	0	0	0	0	0	2	0	1
Dotma	1	0	1	0	1	1	2	3	1	1	0	0
Balajan	0	0	0	0	0	0	1	0	1	1	0	0
Bashbari	0	0	0	0	0	0	0	0	0	0	0	0

Table 11C: Subsidiary manpower in CHCs(II)

CHC	Pharmacist / Compounder		Lab Technician		Radiographer		Computor		Statistical Assistant for MIS		Accountant	
	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position
Kachugaon	0	2	0	1	0	0	0	0	0	0	0	1
Dotma	2	2	2	2	1	1	1	1	1	0	1	1
Balajan	1	1	1	1	0	0	1	1	0	0	0	0
Bashbari	0	0	0	0	0	0	0	0	0	0	0	0

In case of subsidiary staff strength alsoDotma CHC is in an advanced position than Kachugaon CHC. Almost in every section Dotma has acquired sanctioned post and in position staff, including attached regular or contractual staff, whereas in Kachugaon centre, no post has been sanctioned in all sections, available staff are either attached to the centre or engaged as contractual. Although both centres have failed to meet the IPHS norms, Dotma centre is in better position with 26 staff members than Kachugaon that has 16 staff members. On the other hand, the Balajan CHC, one of the two non-functioning CHCs, has a staff strength of 4, while the Bashbari CHC, the other non-functioning CHC, has no staff at all.

5. Conclusion

An attempt has been made to analyse the health inequality in forest and non-forest areas of Kokrajhar district of Assam in India in terms of disease incidences and spatial distribution of health facility. Although health status cannot be well explained only by these two components of health status, these can give insights to the health situations of the areas or communities in concern.

Even though there is no difference in the situations of forest and non-forest areas in regard to the occurrence of prevalent diseases, still there exists a significant difference between the malaria situation in the two areas, situation in forest area being more serious than that in non-forest area. Although the malaria has a decreasing trend in both forest and non-forest areas of the district, there may be sudden rise in the malaria incidences as previous studies on malaria of the district found that malaria incidences in the district has a fluctuating character [14]. Forest area should be the main focus of malaria eradication program in the district.

The uneven distribution of health facilities in the forest and non-forest areas of the district is a matter of serious concern. Beginning right from the health sub centre up to community health centre, forest area people have been discriminated. Policy and implementation of health schemes are running in opposite directions in the district; because health policies aim at providing special care to the backward people, whereas the implementation part provides better facilities to the advanced people.

It is a matter of serious concern that only below 20% of the PHC ranked health centres in the district are functioning as per IPHS norms, which has been more aggravated by non-availability of any CHC in the district functioning with same norm. Non-availability of many vital wards viz. Medicine, Surgical, Eye,ENT and TB wards in the PHCs and CHCs has made the presence of the health centres insignificant. Due to absence of these services the implementation of some important health schemes, such as National Programme for Control of Blindness (NPCB) (which aims at providing Diagnosis and treatment of common eye diseases, Refraction Services, detection of cataract cases and referral for cataract surgery) and Revised National Tuberculosis Control Programme (RNTCP) (which aims at making all PHCs to function as DOTS Centres), has become quite unviable. Behaviour Change Communication has become an integral part of health delivery services in order to cover all aspects of pro preventive care in health care. Though it has been made a requisite of primary health centres, it is nowhere in the health centres of the district as there are no health educators in the existing health centres.

The common phenomenon in the field of health that remote population are also in possession of poorer health facility than the easily accessible population is found to be reflected in this study. Time has come to lay more emphasize on implementation of existing health policies in order to take the health facilities to the doorsteps of the common people.In this regard, the Hospital Management Society, available in the primary health centres, have to play active and important roles. The root causes of deplorable condition of health institutions are to be identified and functioning of the health institutions are to be closely monitoredby them, and corrective/necessary measures are to be suggested to the appropriate authority. Measures should be taken by the health authorities to strengthen such societies.

6. Abbreviations, Acronyms and Definitions in relation to malaria

PV: Plasmodium vivax
PF: Plasmodium falciparum
BSE: Blood slides examined (number of blood slides examined tested for presence of malaria parasite)
POS: Positive (number of confirmed malaria positive cases)
SFR: Slide falciparum rate = (PF/BSE) ×100
SPR: Slide positivity rate = (POS/BSE) × 100
ABER: Annual blood examination rate = (BSE/Population) × 100
API: Annual parasite incidence =(POS/Population) × 1000.

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