

# **HEALTHCARE SERVICES AND OUTCOME IN NORTHEASTERN STATES OF INDIA**

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Declaration

I, DEEPALI CHANU SANASAM, declare that the dissertation entitled "HEALTHCARE SERVICES AND OUTCOME IN NORTHEASTERN STATES OF INDIA" submitted by me in partial fulfillment of the requirements for the award of the degree of **Master of Philosophy** of Jawaharlal Nehru University is an original work and has not been previously submitted for any other degree of this university or any other university.

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Certificate

It is recommended that the dissertation may be placed before the examiner for evaluation.

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*Dedicated to*

*The*

*People of Northeastern states of India*



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## **List of Abbreviations**

SC	Sub-Centre
PHC	Primary Health Centre
CHC	Community Health Centre
DH	District Hospital
ANM	Auxilliary Nurse and Midwife
MHW	Multipurpose Health Worker
LMO	Lady Medical Officer
MO	Medical Officer
OT	Operation Theatre
OOP	Out of Pocket Expenditure
IPHS	Indian Public Health Standard
ICD	International Classification of Diseases
DLHS	District Level Household Survey
ART	Acute Respiratory Tract
DOTS	Directly Observed Treatment Short Course





# Chapter 1

## Introduction

### 1.1 Introduction

“Health is the state of complete physical and mental well- being and not just the absence of diseases or infirmity”.<sup>1</sup> Health is also defined as a set of ‘continuing property’ which is able to take the range of attacks the body can defend which may range from ‘physical, biological, chemical, psychological and social’ (Audy as cited in Meade and Earickson, 2005).<sup>2</sup> While healthcare services means a hierarchy of system which is being built, provided for the sole purpose of promotion, prevention, treatment, rehabilitation and palliation, encompassing healthcare in communities, health centers and hospitals.<sup>3</sup> Healthcare services are important for ensuring good health of the people as health is a fundamental human right essential for attainment of highest possible level of health.<sup>4</sup> Health system is important as ‘it provides the artificial interface between life saving and life enhancing interventions and the people who need them’.<sup>5</sup> Furthermore, healthcare components of healthcare system like the primary healthcare is highly important as it is oriented towards giving diagnosis and treatment of various ailments in the community and hence acting as a gatekeeper to the remaining healthcare system.<sup>6</sup>

Health care system will ensure good health leading to better cognitive development, educational attainments and more leisure time and hence will increase the productivity

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<sup>1</sup>WHO. (2006). *Basic Documents* (p. 1). World Health Organization. Retrieved from [http://www.who.int/governance/eb/who\\_constitution\\_en.pdf](http://www.who.int/governance/eb/who_constitution_en.pdf)

<sup>2</sup>Meade, M.S., and Earickson, R.J. (2005). *Medical Geography*(pp.312-341). New York:The Guilford Press.

<sup>3</sup>The WHO Report (2013). *Research for Universal Health Coverage*. Geneva: World Health Organization.

<sup>4</sup>World Health Organization & United Nation Childrens' Fund.(1978). *Primary Health Care*.Geneva: World Health Organization & United Nation Children’s Fund. Retrieved from <http://apps.who.int/iris/bitstream/10665/39228/1/9241800011.pdf>

<sup>5</sup>Sankar,D. & Kathuria, V. (2004). Health system in Rural India: Efficiency estimates across states, *Economic and Political Weekly*, 39(13), p.1427.

<sup>6</sup>James, W. & Cossman, J. (2006). Does regional variation affect ecological mortality research? An examination of mortality, income inequality and health infrastructure in the Mississippi Delta. *Population Research And Policy Review*, 25(2), 175-195.

leading to higher economic growth. While ill health will cause unemployment leading to the vicious cycle of poverty and ill health (Korpe as cited in Bartley, Ferrie & Montgomery, 2006).<sup>7,8</sup>

Health care facilities comprise both of physical and human resources. In Indian context physical health facilities consist of Sub-centre, Primary Healthcare centre and Community Healthcare centre. The Sub-centre is the heart of rural healthcare system in India today serving about 5000 people in plain areas and 3000 population in hilly/tribal/difficult terrain. Since it occupies the lowest place in the referral centres comprising of SC, PHC, CHC, Sub-divisional/Sub-district Hospital and District Hospitals, it acts as interface with the villages at grass root level.<sup>9</sup> It is manned by an ANM and a Multipurpose Health Worker (Male) so as to provide curative and preventive services along with various national health programmes. The IPHS (2012)<sup>10</sup> had further subdivided into two sub-types with type A providing basic care services and type B providing delivery care services along with basic care services. However, due to data constraint, the current study does not demarcate the two sub-types and is based on the assumption that a sub-centre should have at least the basic minimum services and facilities in order to function smoothly.

The primary healthcare centre provides curative and preventive care to the people. It covers about 20,000 population in hilly or tribal region and 30,000 in plain areas. It is looked after by three Medical Officers out of which there should be least one Lady Medical Officer. It acts as centre for providing preventive, curative and promotive services and referral centre of six sub-centres.<sup>11</sup>

The Community health centres provide specialist services to 1,20,000 populations in plain region and 80,000 populations in hilly or tribal region. It acts as centres for providing

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<sup>7</sup>Bartley, M., Ferrie, J. & Montgomery, S. M. (2006). Health and labour market disadvantage: Unemployment, non-employment and job insecurity. In M. Marmot and R. G. Wilkinson (Ed.), *Social Determinants of Health*(p. 80). New York: Oxford University Press.

<sup>8</sup> Bhore Committee (1946). *Health and Development Survey*, volume I. New Delhi: Government of India, The Manager of Publications.

<sup>9</sup>Directorate General of Health Services (2007). Indian Public Health Standards (IPHS) For Sub- Centres. New Delhi: Directorate General of Health Services.

<sup>10</sup>Directorate General of Health Services (2012). Indian Public Health Standards (IPHS) For Sub- Centres. New Delhi: Directorate General of Health Service

<sup>11</sup>Directorate General of Health Services.(2007). Indian Public Health Standards (IPHS) For Primary Health Centres. New Delhi: Directorate General of Health Services.

specialist care services. It should have at least four specialists which include surgeon, physician, gynecologists and pediatrician along with 21 paramedical and other staff.<sup>12</sup>

In India the health care facilities is comprised of mainly two types i.e., public and private. Public facilities are comprised of the SC, PHC, CHC, government hospitals and clinics etc. as explained before. While private sector is a vast canvas consisting of the ‘non-state service providers ranging from faith healers and quacks’ at one extreme of the continuum and super-specialty-corporate hospitals at the other end. It can be further divided into for profit providers like the individual practitioners to private institute, diagnostic centres etc. The not for profit providers include charitable trust, NGO’s etc.<sup>13</sup> Even if the two are combined, the healthcare expenditure of India is found to be very low accounting just 1.3 per cent of the budget estimate of GDP in 2015-16.<sup>14</sup> A large part of the expenditure is made on private care for instance the eleventh five year plan (2012-17)<sup>15</sup> reported the private expenditure was one of the highest registering about 5-6 per cent household consumption expenditure on health during the tenth plan period while the public sector recorded the lowest accounting for just 1 per cent of GDP.<sup>16</sup>

The framework of public healthcare facilities had been discussed above and before proceeding to the relation between health and healthcare outcome, it is imperative that the origin of the health care system is looked into to get a better picture of the present health outcomes. In fact, the healthcare system has its origin in the ancient civilizations Greeks, Indus valley, Chinese, etc. in various forms and practices such as the Chinese, Ayurvedic, Galenic, Unani, Biomedicine etc.<sup>17</sup> During those times emphasis was upon traditional healing which is still being practiced in various parts of the world today. In terms of healthcare system the Swedish healthcare is an example of the finest welfare system in the world today.<sup>18</sup>

In India, the modern public health system began with the forming of Bhore committee which was envisaged to get a glimpse of the health conditions prevalent at that time and

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<sup>12</sup> Bhandari, L. & Dutta, S. (2007). *Health Infrastructure in Rural India*. India Infrastructure Report 2007.

<sup>13</sup> IDFC Foundation. (2014). *India infrastructure report 2013-14: The road to universal health coverage*, New Delhi: *Orient Blackswan*.

<sup>14</sup> Planning Commission. (2016). *Economic survey (2015-16): Social infrastructure, employment and human development*.

<sup>15</sup> Planning Commission. (2008). *Eleventh five year plan (2007-12): Social sector (volume II)*. New Delhi: Government of India.

<sup>16</sup> *Ibid.*

<sup>17</sup> Meade and Earickson (2005), *op.cit.*, pp. 312-341.

<sup>18</sup> *Ibid.*, pp. 329-330.

made recommendations accordingly. The Bhore committee (1946)<sup>19</sup> made a broach survey of the health conditions prevalent and found the most prevalent causes of death to be like fevers (58.4 per cent), respiratory (7.6 per cent), dysentery and diarrhoea (4.2 per cent), cholera (2.4 per cent), etc in 1932-41 British India. Furthermore, the life expectancy at birth was found to be as low as 26.91 years for male and 26.56 years for female in 1921-30 periods. Infantile mortality and MMR was found to be very high numbering 162 per 1000 and 20 per 1000 live births respectively. These numbers reflect the poor condition of health care facilities which was also supported by the fact that personnel posted at healthcare facilities were overburdened as reflected by the ratio of 1 doctor per 6300 population, one nurse per 43,000 populations and one midwife per 60,000 populations.<sup>20</sup> On top of it, there were huge compromises in the quality of services with just 48 seconds being given to each patient on an average. Furthermore, the medical officers posted at dispensaries were ‘out of touch’ with modern technology and hence not being able to provide latest healthcare services.<sup>21</sup>

To address the problems of poor health conditions and to improve the poor health infrastructure, the Bhore Committee (1946)<sup>22</sup> made certain recommendations which include a wholesome vision of healthcare with short term plan for ten year and long term plan for three million populations. Recommendations were made to were organize the primary unit with six Medical officer, six Public health nurses and a 75 bed Hospital, secondary units with an Administrative officer, two senior Public health nurses, two Sanitary inspectors and 650 hospital beds and district units proportional number of MO and other personnel and 2500 beds under it. These provisions were made so as to provide both curative and preventive cure the most prevalent communicable diseases during those times such as malaria, tuberculosis, leprosy, venereal diseases, mental diseases etc.

With the attainment of independence of India and adoption of the constitution of India, the country further organized the health services into Union list and Concurrent list in its’ first ever five year plan (1951-56). Subjects like “public health and sanitation hospitals and dispensaries were put into Union list and prevention of the extension from one state

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<sup>19</sup> Bhore Committee (1946). *Health survey and development committee* (Vol. II, pp. 8-10). Government of India, *The Manager of publications*.

<sup>20</sup> *Ibid.* p.13.

<sup>21</sup> *Ibid.* p.14.

<sup>22</sup> *Ibid.*

to another state of infectious and contagious diseases or pest affecting men, animals or plants” into concurrent list.<sup>23</sup>

After the end of the first and second five year plans and the beginning of the third five year plan saw another committee being initiated for the improvement of Indian healthcare system. The committee being the Mudaliar Committee (1962)<sup>24</sup> which recommended various changes to the then existing scheme of healthcare services. Some of the most important provisions included reduction in average population covered per PHC to 40,000 along with providence of other staffs, mobile health units for covering the rural population left out PHC area, poorly equipped PHC. One revolutionary recommendation which seek to improve the quality of healthcare was to provide facilities of residential accommodation to all the personnel of the centre with bed strength of 10 with two beds for emergency case.

All the five year plans previously focused on eradication of malaria which was integrated with family planning in the third five year plan (1961-66)<sup>25</sup>. This integration of family planning with general healthcare services was made by Chadha committee (1963)<sup>26</sup>. However, the Mukherjee committee (1965)<sup>27</sup> recommended that the integrated practice be done away with so that health personnel could give their undivided attention upon family planning services.

The fourth five year plan (1969-74)<sup>28</sup> for the first time marked the increased in budget outlays for healthcare in India with increasing focus upon family planning but also seek to provide an effective base health care facilities in rural areas by focusing upon the primary care units.

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<sup>23</sup>Planning Commission (1951). First five year plan (1951-56). New Delhi: Government of India.

Retrieved from <http://planningcommission.gov.in/plans/planrel/fiveyr/welcome.html>

<sup>24</sup> Mudaliar Committee (1961). *The Health Survey and Planning Committee* (1961). Government of India.

<sup>25</sup>Planning Commission (1960). Third five year plan (1961-66). New Delhi: Government of India.

Retrieved from <http://planningcommission.gov.in/plans/planrel/fiveyr/welcome.html>

<sup>26</sup>Chadha committee (1963). Retrieved from

[https://www.nhp.gov.in/sites/default/files/pdf/chada\\_committe\\_report.pdf](https://www.nhp.gov.in/sites/default/files/pdf/chada_committe_report.pdf)

<sup>27</sup> Mukherjee Committee (1965). Retrieved from [https://www.nhp.gov.in/mukherjee-committee-1965\\_pg](https://www.nhp.gov.in/mukherjee-committee-1965_pg)

<sup>28</sup>Planning commission.(1969). *Fourth Five Year plan (1969-74)*. New Delhi: Government of India. Retrieved from <http://planningcommission.gov.in/plans/planrel/fiveyr/welcome.html>

Another important chapter in the history of healthcare services in India was the sixth five plan (1980-85)<sup>29</sup> which tried to implement the recommendation of the Kartar Committee (1973)<sup>30</sup> and adopted the conversion of the health personnel engaged in vertical public health initiatives to be converted into multipurpose health worker. The sixth plan laid down the current population ratio for sub-centre and primary health centre which were 3000/5000 per sub-centre in a hilly/tribal/plain region and 20000/30000 per primary health centre in a hilly/tribal/ plain area.

After the sixth plan, the most important development in history of Indian health care system was the National Health Policy (1983)<sup>31</sup> which emphasized the importance of family planning, ensured the universal providence of healthcare services and also to prevent the spread of communicable diseases with focus upon the nutrition of mother and child. This policy was also emphasized on decentralization of primary healthcare services for ensuring an optimum level of services.

Another important step in the history of Indian health care system was initiation of the Bajaj Committee (1986)<sup>32</sup> at the beginning of the seventh five year plan (1985-90). The committee recommended the organization of the health sectors into 4 tiers with the lowest tier being occupied by village level training of village level workers with sub-centres, primary health centres and community health centres. The committee stuck with the earlier population norm laid down in the sixth five year plan (1980-85) for SC, PHC and CHC which are still followed today with little or no modification. The eight five year (1992-97)<sup>33</sup> plan was more or less the same with the seventh five year plan with focus upon improving health and population control, strengthening the minimum need programme.

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<sup>29</sup>Planning Commission (1980).*Sixth Five Year Plan (1980-85)*.New Delhi: Government of India. Retrieved from <http://planningcommission.gov.in/plans/planrel/fiveyr/welcome.html>

<sup>30</sup>Kartar Singh Committee (1973).Retrieved from [https://www.nhp.gov.in/sites/default/files/pdf/Kartar\\_Singh\\_Committee\\_Report.pdf](https://www.nhp.gov.in/sites/default/files/pdf/Kartar_Singh_Committee_Report.pdf)

<sup>31</sup>Ministry of Health and Family Welfare.(1983). *National Health Policy* (p.4). New Delhi: Government of India

<sup>32</sup> Bajaj Committee (1986). Retrieved from [https://www.nhp.gov.in/sites/default/files/pdf/Bajaj\\_Committee\\_report.pdf](https://www.nhp.gov.in/sites/default/files/pdf/Bajaj_Committee_report.pdf)

<sup>33</sup>Planning Commission (1992).*Eight Five Year Plan (1992-97)*. New Delhi: Government of India .Retrieved from <http://planningcommission.gov.in/plans/planrel/fiveyr/welcome.html>

However, the history of healthcare system saw a change during the ninth five plan (1997-2002)<sup>34</sup> with emphasis being given to eradication of non-communicable diseases. It introduced certain new initiatives for diseases control and environmental impact assessment such as the ‘Integrated Non-Communicable Diseases control Programme’, ‘Health Impact Assessment’ so as to assess the effect of development upon health. Another major initiative taken during the ninth five year plan was to improve the existing structure of healthcare facilities and operationalisation of Health Management Information System (HMIS).

At the end of the ninth five year plan, the national health policy (2002)<sup>35</sup> came which envisioned upon the need to increase funding and restructure the national public health initiatives so as to reduce the inequities in access to healthcare services. As such, it was proposed to increase the health expenditure to 6 per cent of the GDP and 2 per cent to be spent upon public health investment by 2010 which is still not achieved today. One remarkable feature of the plan was its’ effort to converge all health programmes under a single administration with continuance of the existing programmes on control of diseases like TB, malaria, HIV/AIDS etc. It gave high emphasis to health education through school health programmes on preventive action and increase knowledge to seek healthcare.

A new perspective was being given upon healthcare with the coming of the eleventh five year plan (2007-2012)<sup>36</sup> which focused upon ensuring accessibility and affordability of public healthcare for the poor people. This plan recognized the importance of ensuring access to affordable and quality healthcare facilities as high cost in health care utilization on their part may drive the people into poverty or lead to extreme poverty.

However, the most ambitious of all five year plan is the twelfth plan (2012-17)<sup>37</sup> which aims to bring about universal coverage of the populations in the country in terms of access to health facilities without any cost. It also aims to target the minorities in terms of

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<sup>34</sup>Planning Commission (1997).*Ninth Plan (1997-2002)*.New Delhi: Government of India .Retrieved from <http://planningcommission.gov.in/plans/planrel/fiveyr/9th/vol2/v2c3-4.htm>

<sup>35</sup> National Health Policy (2002).Retrieved from [https://www.nhp.gov.in/sites/default/files/pdf/National\\_Health\\_Policy.pdf](https://www.nhp.gov.in/sites/default/files/pdf/National_Health_Policy.pdf)

<sup>36</sup>Planning Commission (2008).*Eleventh Five Year Plan (2007-12)*(pp.57-70).New Delhi: Government of India, Oxford University Press.

<sup>37</sup>Planning Commission (2013) .*Twelfth Five Year Plan (2012-17)*. New Delhi: Government of India.

providing healthcare services. This is in line with the WHO initiative to ensure Universal Health Coverage of 2013.

Despite all the programmes being undertaken in India to improve the health system, India still has a shortage of 13.16 per cent sub-centres, 18.46 per cent primary health centres and 40.89 per cent community health centres underscoring the need to study the availability of healthcare facilities or services in detail.

Also, with regard to the health conditions of people, there is still a need to improve the health outcomes in terms of morbidity and mortality. India is still having a high MMR of 167 per 1,00,000 women (2013)<sup>38</sup> and IMR of 37 (2015)<sup>39</sup> despite after 65 years of planning. This makes it all the more necessary to study the healthcare facilities at a deeper level and especially in regions of Northeast India which is geographically inaccessible.

The study is focused on examining the efficiencies of healthcare facilities or services in three areas namely the availability, accessibility and affordability of healthcare facilities or services. However, priority has been given to availability of healthcare facilities as debate of accessibility and affordability will only come when there is adequacy in healthcare facilities or services in terms of health institutions and trained personnel. Availability in simple terms means the existence of “adequacy of the supply of physicians, dentists and other providers; of facilities such as clinics and hospitals; and of specialized programs and services such as mental health and emergency care”<sup>40</sup> In India the available number of healthcare facilities which may include the hospitals, clinics, Sub-centres, Primary healthcare centres, Community healthcare centres, human resources like the Gynaecologists, Pediatricians, Obstetricians, Auxilliary Nurse and Midwife (ANM), Accredited Social Health Activists (ASHA), Lady Health Officer (LHV), Medical Officer (MO) etc which are in existence for providing healthcare services.<sup>41</sup> Meanwhile, health facilities or services and its access are determined by various factors such as physical, social, political etc.

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<sup>38</sup>Office of the Registrar General & Census Commissioner.(2011-13). *Maternal mortality ratio bulletin 2011-13*. Retrieved from [http://www.censusindia.gov.in/vital\\_statistics/mmr\\_bulletin\\_2011-13.pdf](http://www.censusindia.gov.in/vital_statistics/mmr_bulletin_2011-13.pdf)

<sup>39</sup> Registrar General (2016). *SRS Bulletin*. Registrar General of India, 50(2), p. 1.

<sup>40</sup>Penchansky, R. & Thomas, W. J. (1981). The concept of access: Definition and relationship to consumer satisfaction. *Medical Care*, XIX, p. 128.

<sup>41</sup>Bhandhari&Dutta (2007), op. cit. p. 255-256.



When it comes to accessibility, the study has been organized on spatial and non-spatial<sup>42</sup> as the framework. Spatial factors like the physical or geographical factor are most profound in areas of rough terrain and topography like the northeastern states of India constraining access to healthcare facilities. While non-spatial factors include the “non-geographic barriers or facilitator like the age, sex, income, gender, social class, education and language ability”<sup>43</sup> play enormous role in access to healthcare. Apart from these factors political willingness to provide healthcare facilities also play a role in ensuring access to the people especially in region of Northeast India marked by conflicts and turmoil.

The third component of the study deals with affordability of healthcare services. Affordability in simple term means the ability to pay, arrange credit for the services being provided by the healthcare system. The debate of affordability has been occupied by ability to pay and willingness to pay.<sup>44</sup> Here, the income of the family plays a crucial role in ensuring affordability. Most of the time affordability of healthcare facilities has been questioned on account of huge out of pocket expenditure on part of the patients pushing the poor families below poverty line, or resulting in huge debts for the patient family.<sup>45</sup> The present study highlights profound influence of various factors upon health conditions of the people of Northeastern India.

The second most important part of the study tries to highlight the relation between healthcare services/facilities and healthcare outcomes. Health care outcome is used to assess the performance of healthcare services. Due to data constraints, variable such as prevalence of morbidity and ratio of death cases per 1000 populations have been taken as outcome variables. It is important to study the outcome of health as the occurrence of a particular illness causes demand for health which in turn causes supply for healthcare. Healthcare is demanded by the people on the assumption that it has certain ‘investment

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<sup>42</sup>Wang, F & Luo, W. (2005). Assessing spatial and non-spatial factors for healthcare access towards an integrated approach to defining health professional shortage areas. *Health & Place*, 11(2), p.1.

<sup>43</sup>*Ibid.* p 1.

<sup>44</sup>Glied, S. (2009). Mandates and the Affordability of Healthcare. *Inquiry*, 46, p. 207.

<sup>45</sup>Dey, S., Nambiar, D., Lakshmi, J.K., Sheikh, K. & Reddy, K.S. (2012). Health of the Elderly in India: Challenges of access and affordability. In J. P. Smith and M. Majmundar (Ed.), *Aging in Asia: findings from new and emerging data initiatives* (pp. 377-378). Washington (DC): The National Academies Press.

benefits in health status<sup>46</sup>. Hence, it can be said that healthcare is a derived demand and is demanded by the consumer for engaging in production and consumption activities. However, demand for healthcare will only occur when the consumer is ill even if they would rather not be ill.<sup>47</sup> With the demand for healthcare comes the demand for health insurance as the consumer has little knowledge for the treatment cost which might incur later on and hence they tend to buy health insurance so as to reduce the burden of treatment later on. However, the demand for health can also be made through investment in leisure time in combination with other consumption activities.<sup>48</sup>

Supply side of healthcare deals with the healthcare system the services being provided by healthcare system. Often low quality of healthcare and inaccessibility of healthcare system had led to low demand of healthcare in India. Also, demographic and socio-economic characteristics of the people determine demand to a large extent. The reasons may be financial constraints, lack of awareness of healthcare and low ability to perceive diseases and their degree of illness.<sup>49</sup> The health care outcome and healthcare facilities or services had been estimated using bivariate regression between availability of healthcare and prevalence of morbidity and proportion of death. Multivariate regression between availability, accessibility and affordability as the supply side variable and morbidity, proportion of deaths, socio-economic characteristics as demand side variable had been conducted. The results of the analysis have been discussed in the following chapters of the study.

## **1.2 Statement of the problem**

India seeks to achieve universal healthcare as a part of the WHO (2013)<sup>50</sup> goal. Committees such as Bhore committee (1946), Mudaliar committee (1962), Chadha committee (1963), Kartar Singh Committee (1973) had come and accordingly

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<sup>46</sup>McMuire, Alistair.,J,Henderson& G, Mooney (1988). The Economics of Health Care: An Introductory text (p. 3). *Routledge and Kegan Paul*.

<sup>47</sup>*Ibid.* p. 5.

<sup>48</sup>Muire, Henderson & Mooney (1988), *op. cit.*, p. 5.

<sup>49</sup>Mukherjee, A.N. &Karmakar, K. (2008). Untreated morbidity and demand for healthcare in India: An analysis of national sample survey data. *Economic and Political Weekly*, 43(46), p. 73.

<sup>50</sup>WHO (2013), *op.cit.*,p. 6.

recommendations had been made to address the problem of shortages of healthcare facilities or services. Various Health plans such the National health plan (1983), National health plan (2002) had envisaged to provide universal access to healthcare, increase the ratio between nurses and doctors and many other goals and vision. To realize the vision laid down in various plans and recommendations of various committees mentioned above, there need to be an adequate and efficient health services in place especially in remote and inaccessible regions like the Northeastern states of India.

The region may be known for good performance in social indicators as indicated by comparatively better sex ratio (above national average of 943 in 2011 except for states like Sikkim and Arunachal Pradesh which had the lowest in NER)<sup>51,52</sup> and literacy rates (above national average of 74.04 per cent in 2011 except for Assam and Arunachal Pradesh)<sup>53,54</sup> which may not necessarily lead to good health outcome. The IPHS (2007)<sup>55, 56,57</sup> had laid down population norms for health facilities like SC, PHC and CHC for plain areas and tribal/hilly regions which had been used as a measure of availability of healthcare facilities. But, population provider ratio as indicator of availability of healthcare facilities may not truly reflect the availability of healthcare facility in the region as the distribution of population in the region is not uniform. The problem is to examine whether the health facilities really contributes to the good health outcomes of the region. Furthermore, with huge shortages in availability of health care services in the country, it becomes very important to study availability of health care services at a greater detail than accessibility and affordability. Also, the question is not about mere availability of physical healthcare service/facility but whether there are enough personnel to provide quality care services.

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<sup>51</sup>Census of India (2011). *India Profile* (pp. 1-2). Retrieved from

[http://censusindia.gov.in/2011census/censusinfodashboard/stock/profiles/en/IND\\_India.pdf](http://censusindia.gov.in/2011census/censusinfodashboard/stock/profiles/en/IND_India.pdf)

<sup>52</sup>North Eastern Council Secretariat (2015). *Basic Statistics of North Eastern Region 2015*. Directorate of Printing & Stationary, Government of Meghalaya.

<sup>53</sup>Taher, M. & Ahmed, P. (2012). *Geography of North-East India* (p. 1). Guwahati: Mani Manik Prakash

<sup>54</sup>Census of India (2011). Provisional Population totals-India, (101). Retrieved from

[http://censusindia.gov.in/2011-prov-results/data\\_files/india/Final\\_PPT\\_2011\\_chapter6.pdf](http://censusindia.gov.in/2011-prov-results/data_files/india/Final_PPT_2011_chapter6.pdf)

<sup>55</sup>Directorate General of Health Services (2007). *op. cit.*, pp. 1-10.

<sup>56</sup>*Ibid.* pp. 9-10.

<sup>57</sup>Directorate General of Health Services (2012). *Indian public health standards (IPHS) for community healthcentres*. New Delhi: Directorate General of Health Services.

There are huge shortages in human resources as elaborated by the eleventh five year plan (2007-12) which stated that India had only 45 lakh doctors out of total requirement of 85 doctors, while nurse and ANM were only 75 per lakh population out of the norm of 255 per lakh population.<sup>58</sup> Another problem worth analyzing is whether there is equality in availability, accessibility and affordability to healthcare in the hills and valley districts of the region keeping in mind the inaccessibility of the topography of the region. However, it is to be noted that availability of healthcare facilities is not the only factor determining health outcomes. But, geographical factors like topography and its accessibility does play a role in determining status or outcomes of the people. Accessibility is also hindered by distance from the service provider and the human resources available apart from the socio-economic factors like education, income and ones' social status. Since the Northeastern region is comprised of hilly areas in 72 per cent of the region, the dominating role of topography upon accessibility needs to be studied. As the region is known for its diverse tribes and cultural practices so their preferences of treatment of healthcare facilities will vary accordingly. These factors may play an important role in the outcomes of healthcare in forms of morbidity and proportion of deaths which have been studied at regional and district level. The northeastern region is economically poor with most of the population engaged in primary occupation. Here, it becomes imperative to study the affordability of healthcare services. Previous studies conducted points to the unavailability of in depth analysis of healthcare facilities linking with outcome at district level and hence need to be studied.

### **1.3 Rationale of the study**

Universal Health Coverage is one of the important goals of post Sustainable Development of the WHO Report 2015. As the saying goes 'health is wealth', developing economy like India needs proper health care infrastructure in every nook and corner of the country. While providing healthcare services is a start, it is equally important to ensure proper access and utilization of healthcare facilities. This will ensure good health and productivity as more energy has been channeled to economic activities rather than on

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<sup>58</sup>Planning Commission (2013), *op.cit.*, p.1.

taking care of the unhealthy and the diseased.<sup>59</sup> However, this healthcare availability, accessibility, affordability are controlled by various determinants in the North Eastern Region of India which may be geographical, political, social, economic etc.

The study seeks to examine the factors affecting the healthcare outcomes which may define (set the terms for) the accessibility and utilization of healthcare services in the region known for its rough terrain and topography. As the region is inhabited by diverse tribes and ethnic groups, importance of various determinants in accessing and utilization of healthcare services becomes very important. It is important to know how the social groups like Scheduled caste, Scheduled Tribes, OBC and others perform in terms of health outcomes they are living in a topographically disadvantageous location. Furthermore, northeast India often remains neglected from the literatures dealing with burden of illness coupled with lack of healthcare facilities. Hence, the need to study healthcare facilities with morbidity as an outcome indicator of health care services provided in the region.

Also, being a region of resource deprived and marked by lack of employment opportunities, it becomes all the more important to analyze how poverty, unemployment shapes the health outcomes of the region. Furthermore, poverty and unemployment may be confined to a particular social group which may have been inherited. This needs to be studied for ensuring proper targeting of particular group to ensure access and utilization of healthcare ultimately to make sure productivity of people, region and of the country at large. Another important aspect is the level of education and health education which controls utilization of healthcare. Although level of literacy is good on an average in the region, it is important to study how this particular factor affects the burden of ill health in the various geographical regions of Northeast India.

Outcome of healthcare services is also studied from the perspective of proportion of deaths. Often, people in Northeast India are found to be not availing the healthcare facilities due to varied reasons. As the disease burden of communicable and non-communicable diseases are high, death due to lack of healthcare services is also suppose

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<sup>59</sup>The argument of productivity as a result of good health is that while good health ensures participation in productive activities, engaging in economic activity will in turn ensure that the bodily requirement for nutrition are met, building resistance against diseases and ill health.

to be high in Northeast India. From this perspective, it is important to study healthcare services availability, accessibility and affordability in the region.

#### **1.4 Objective**

- i. To examine the level and inequality of availability of physical healthcare facilities and quality of human resources at regional, districts levels.
- ii. To assess the inequalities in accessibility of physical infrastructure and human resources across regions and districts in the NE states of India.
- iii. To analyze the inequalities in affordability of healthcare services across regions and districts.
- iv. To evaluate the outcomes of availability of health infrastructure with morbidity and mortality across regions and districts.
- v. To determine the factors contributing to health outcome.

#### **1.5 Research Question**

1. What are the level and the inequality present in the availability of physical healthcare services and human resources available in the Northeast India at regional, district levels?
2. What is the level and inequalities in accessibility of healthcare facilities and human resources in the regions and districts?
3. What is the level and inequalities in affordability of healthcare services across regions and districts?
4. How do healthcare facilities fare with morbidity and number of deaths across district?
5. What are the factors determining the outcome of healthcare facilities at district level?

#### **1.6 Database**

The study deals with healthcare services and the essential healthcare facilities required for functioning at optimum level. For the purpose of conducting the analysis of healthcare

services, the latest round of data from District level Household Survey 4 (2012-2013) have been used for the purpose of analysis at regional and district levels. The survey conducted at district level in all the states except for EAG states and Assam gives detailed insights regarding the public health infrastructure available in rural India. Both unit level data and reports from DLHS-4(2012-13) have been used. State wise reports of all the northeastern states dealing with healthcare facilities are available. For analyzing the availability of healthcare services, state wise reports of all the northeastern states have been used as unit level data dealing with SC, PHC, CHC and DH are not yet published at the time of the study. Unit level data has been used for analyzing the inequalities in accessibility, affordability of healthcare services. Also, unit level data has been used for analyzing the outcomes of healthcare facilities such as morbidity and proportion of death. For finding accessibility and health care outcomes, person data has been used while women's data for taking out the affordability variables from the set of data.

## **1.7 Methodology**

The study requires the adoption of certain set of methodology for the purpose of answering the line of enquiry adopted in various research questions and objectives. Each variable has been chosen after a careful analysis of the indicators used in various literatures and also from the availability and comparability of the data from district level household survey 4 (2012-13). The data extracted has not been weighted due to the limitation of the data set. Moreover, the weighted data instead of multiplying in numbers for the whole population decreases. This may be because the population in northeast is small and after giving weights, the actual sample size decreases as weights is calculated taking into account the population of India as a whole. However, the use of unweighted data set is justified as any primary survey based studies use unweighted data. The same logic can be applied in this study which will solely represent the sample of the study only. Apart from data sets, software like STATA has been used for cross tabulation of the various indicators. Then the indicators have been used for construction of composite index of physical health infrastructure, human resources, prevalence of morbidity, proportion of death etc. These dataset are compiled in XCEL sheet and imported in STATA for analysis. Most of the data have been used from individual file of

DLHS-4. Also, it is to be noted that each level of DLHS- 4 is self sufficient as it contains almost all the variables and hence not needed for merging for the study to be conducted. The methodology to be adopted is based solely on the need to answer the research question.

The different set of methodology has to be adopted for each research objective which are discussed below:

### **1.7.1 Research Q.1 What is the level and the inequalities present in the availability of physical healthcare services and human resources available in the Northeast India at regional, district levels?**

For the purpose of calculating the status of availability of healthcare facilities, the variable such as average person covered by SC's, average person covered PHC's, average person covered by CHC are taken out from the report of DLHS-4 (2012-13) and composite index is calculated using mean by value method for positive indicators and value divided by mean method for negative indicators. The norm for health infrastructure as laid down by IPHS (2007) is 3000 per SC<sup>60</sup>, 20,000 per PHC<sup>61</sup> and 80,000 per CHC<sup>62</sup> in hilly areas and 5000 per SC<sup>63</sup>, 30,000 per PHC<sup>64</sup> and 1, 20,000 per CHC<sup>65</sup> in plain areas followed for analyzing the availability of healthcare service facilities. The same process is repeated for assessing the availability of human resources at regional and district level. The physical healthcare services available and human resources available are analyzed at four levels: at sub-centre, at primary health centre, at community health centre and at district hospital. For the purpose of giving weights, equal weightage has been given to all the indicators as they are equally important. The averages of composite indices are taken for finding the value for regional level analysis. Also, averages of percentages availability of each indicator at SC, PHC, CHC and DH are taken for different regions and state for the study. For the purpose of analysis the composite indices are then categorized into five categories using mean and standard deviation method. The districts are either represented in tables or Choropleth map or analyzed accordingly. District wise Choropleth map of physical health care services available is drawn to show the

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<sup>60</sup> Directorate General of Health Services (2007), *op. cit.*, pp. 1-10.

<sup>61</sup> *Ibid.*, pp. 9-10.

<sup>62</sup> Bhandari & Dutta (2007), *op. cit.*, pp. 265-266.

<sup>63</sup> Directorate General of Health Services (2007), *op. cit.*, pp. 1-10.

<sup>64</sup> *Ibid.*, pp. 9-10.

<sup>65</sup> Bhandari & Dutta (2007), *op. cit.*, pp. 265-266.



pattern of inequalities in availability of both physical infrastructure and human resources. For the purpose of finding inequality, co-efficient of variance is calculated at regional and district level.

The value of co-efficient of variation is grouped into four categories for comparing the level of inequalities at regional and district level. The categories are very high (CV of 60 and above), high (40 to 60 CV), medium (CV 20 to 40) and low (CV 0 to 20).

### **1.7.2 Research Q.2 What are the inequalities in accessibility of healthcare facilities and human resources in the regions and districts?**

Accessibility has been calculated from distance and service provider to population perspective. Accessibility from distance perspective would be calculated based upon the norms laid down for distances for the location of SC's and PHC's which are  $\leq 3$  kms,  $\leq 10$  kms respectively.

Table 1.1 Categories of accessibility of healthcare services.

Sl.no.		Accessibility in distance (kms)
Sub-centre	1.	$\leq 3$
	2.	4-10
	3.	$\geq 10$
Primary Healthcare Centre	1.	$\leq 10$
	2.	11-20
	3.	21 & above
Community Health Centre	1.	0-20
	2.	21-40
	3.	41 & above

While there is no clear cut distance norm for CHCs but there has been set at  $\leq 20$  kms for the sake of the study. Accordingly, for the convenience of analysis the distances for each

facility will be further categorized into three sub-categories. The sub-categories are given in Table 1.1.

Analysis is carried out by categorizing the composite indices of accessibility at SC within 3 kms, PHC within 10 kms and CHC within 20 kms. The rest of the categories in SC, PHC and CHC are used for supporting the argument for accessibility and inaccessibility of each service facility

Meanwhile, to find out human resources accessibility the service provider to population ratio is calculated for each district using the indicator ‘availability of lady doctors in the village (staying/ visiting)’. This particular indicator has been taken from the village level data to highlight the actual accessibility of human resources in the villages as mere availability of doctors on paper does not truly reflect the actual accessibility by villagers. This is especially true in regions like northeast India where the harsh topography coupled with lack of infrastructure makes it difficult to attract doctors to stay at the place of posting. Density of doctors staying/ visiting the villages is calculated per 10,000 populations to find region wise and district wise inequality in human resources accessibility.

### **1.7.3 Research Q.3 What is the level and inequalities in affordability of healthcare services across regions and districts?**

For answering this question, the variables total expenses on cost of delivery, total amount received from JSY during pregnancy and after delivery; total amount received from other government schemes during pregnancy and or after delivery are used. Total amount received from JSY during pregnancy and after delivery is added with total amount received from other government schemes during pregnancy and or after delivery to get the actual amount received from government. This value is then subtracted from the total expenses cost of delivery to get the actual out of pocket expenditure of the districts. Source of out of pocket (OOP) expenditure is also taken out at district level to find out the actual affordability of healthcare services. Here, the total cost incurred at delivery is taken as proxy variable of cost of medical expenditure for the whole population due to unavailability of consumption expenditure data on healthcare services at district level.

The sources of OOP expenditure obtained from DLHS-4 women's data are borrowings, selling of property, selling of jewellery, insurance, unknown sources and other sources. The two sources selling of jewellery and selling of property are clubbed for better interpretation. Composite index of OOP expenditure is categorized into five categories at regional and district level using the method mentioned before. Analysis is done based on the concept of ability to pay and willingness to pay. Higher the OOP expenditure, higher the willingness to pay and but lesser the affordability of healthcare services and vice versa.

#### **1.7.4 Research Q.4 How do healthcare facilities fare with morbidity and proportion of deaths across districts?**

For the purpose of answering this question, composite index of physical healthcare services available and human resources have been constructed and summed to get 'total healthcare services available'. Morbidity data is taken from unit level data of DLHS-4 which reports two types of morbidity: acute illness during last 15 days and chronic illness during last one year. Chronic illness is recoded into 14 sub-types of illness following the 10<sup>th</sup> ICD classification of disease. The DLHS-4 survey collected data on 31 sub-types of chronic illness along with 'other' and undiagnosed chronic illness which together made up as 33 sub-types. Since, it is really difficult to analyze such large sub-types of a particular illness, the grouping was done for chronic diseases. Then, the sample populations for each district as reported in the DLHS4 survey are taken for calculating prevalence rate. This will truly reflect the diseases occurring amongst the sample population.

**Morbidity prevalence rate(acute) = Number of persons reporting acute illness during last 15 days per 1000 population of the district.**

**Morbidity prevalence rate(chronic) = Number of persons reporting chronic illness during last 1 year per 1000 population of the district.**

For the second part of the question, mortality rate is not taken as district wise mortality rate for Northeast India is not given by sample registration system (SRS). Instead, number of deaths as reported in the DLHS- 4 survey is taken as proxy indicator for mortality. Here, number of deaths up to the age of 66 years which is the life expectancy of India as per SRS, 2014 is taken. The underlying logic is that mortality taken after the average life expectancy as an outcome variable will to more cases of death and will result in the biasness of the result in favour of poor outcomes of health care services. Rather an attempt is made to show the regional variation in proportion of death and not as an outcome of health care services. However, the study also tries to association proportion of death with healthcare facilities available so as to find any possible link between the two.

**Proportion of deaths = number of deaths up to the age of 66 years in each district per 1000 populations of the district.**

So as to answer the question, the total index of healthcare services obtained associated with acute illness, chronic illness and proportion of deaths across districts.

#### **1.7.5 Research Q.5. What are the factors determining the outcome of healthcare facilities across regions and districts?**

For the purpose of answering the fifth question, a set of variables is taken from DLHS- 4 (2012-13) unit level data. The independent variables include availability of total healthcare services, accessibility of healthcare services, affordability of healthcare services, socio-economic variables like scheduled tribe population, persons engaged in primary occupations, graduate/B.B.A/B.Tech/MBBS /equivalent as, secondary education independent variables. These particular socio-economic variables are found to be the most significant in the regression test. Three separate multivariate regression model were done with each showing different result. In the first model acute illness is taken as dependent variable, chronic illness as dependent variable in the second model and proportion of deaths in the third model. A more detailed explanation regarding each model is given in chapter four.

**Regression equation:**

**Model 1**  $Y = \beta_0 + \beta_1 \text{Prioccp} + \beta_2 \text{Grad} + \beta_3 \text{TAccess} + \beta_3 \text{Affor} + \beta_4 \text{ST} + \beta_5 \text{THs} + E_i$

Where Y= acute illness during last 15 days.

Prioccp = persons engaged in primary occupation.

Grad = persons who are graduate/B.B.A/B.Tech/MBBS /equivalent.

TAccess= total accessibility of healthcare services.

Affor= affordability of healthcare services.

ST= persons belonging to ST group.

THs= Total healthcare services available.

**Model 2**  $Y = \beta_0 + \beta_1 \text{Prioccp} + \beta_2 \text{Grad} + \beta_3 \text{TAccess} + \beta_3 \text{Affor} + \beta_4 \text{ST} + \beta_5 \text{THs} + E_i$

Where Y= chronic illness during last 1 year.

Prioccp = persons engaged in primary occupation.

Grad= persons who are graduate/B.B.A/B.Tech/MBBS /equivalent.

TAccess= total accessibility of healthcare services.

Affor = affordability of healthcare services.

ST = persons belonging to ST group.

THs= Total healthcare services available

$$\text{Model 3} Y = \beta_0 + \beta_1 \text{Prioccp} + \beta_2 \text{Secon} + \beta_3 \text{TAccess} + \beta_4 \text{Affor} + \beta_5 \text{ST} + \beta_6 \text{THs} + E_i$$

Where Y= chronic illness during last 1 year.

Prioccp = persons engaged in primary occupation.

Secon = persons who are educated till secondary level.

TAccess= total accessibility of healthcare services.

Affor = affordability of healthcare services.

ST = persons belonging to ST group.

THs= Total healthcare services available

### 1.8 Limitations of the study

The study was constrained by certain limitations which are given below:

- i. The biggest limitation was the unavailability of unit level data of sub-centre, primary health centre, community health centre and district hospital. Although data were taken from states wise reports of Northeast. The unavailability of unit level data made it impossible to merge the data, find the correlation between healthcare services availability, accessible and affordable. Also, the healthcare services availed by different socio-economic groups cannot be shown in the study.
- ii. Another limitation was the problem regarding giving weight to DLHS-4 unit level data. After giving weight, the data instead of multiplying in numbers became smaller in sample size by few numbers. For this reason, unweighted data has been used and the result of the study can be applied only to sample population.

- iii. As not all the data were available in unit level, merging cannot be done. Even if village level data can be used, the village level data had limited variables for each healthcare facility. Hence, based on the need of the study, healthcare facility data from village level was not used.

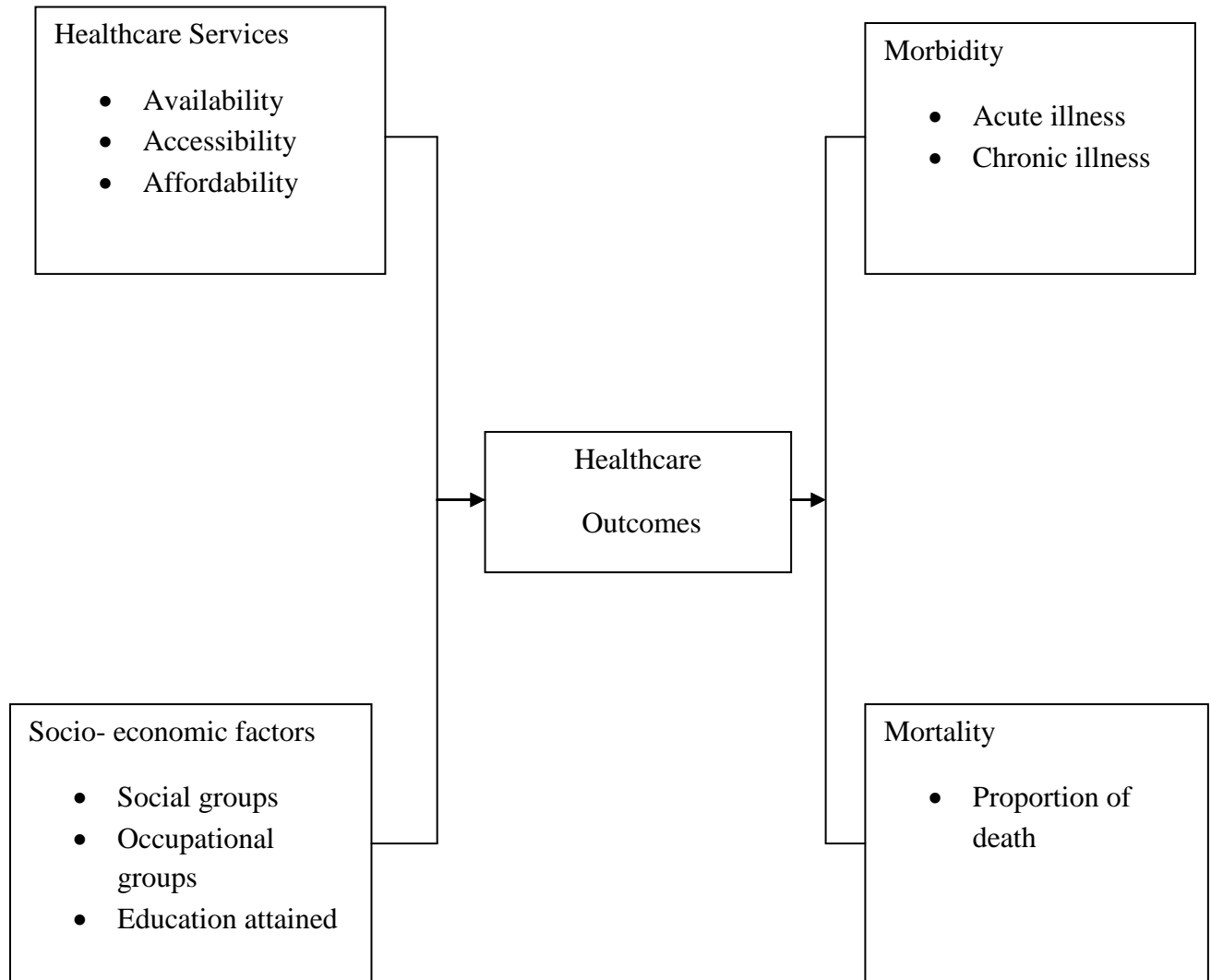
## **1.9 Conceptual framework**

Healthcare services are essential for good health outcomes of the population. Health care services are even more important in rural and hilly regions of northeast India. Being hilly and economy still underdeveloped, the occurrence of acute and chronic diseases caused by malnutrition is most likely in northeast India. Here, lies the importance of studying the availability, accessibility and affordability of health care services in Northeast India. The conceptual framework tries to establish the linkages between healthcare services and various socio-economic factors which might affect the health outcome in the region.

The conceptual framework consists of two domains: the healthcare services domain and the healthcare outcomes domain. The healthcare services domain in the left hand side consists of the availability, accessibility and affordability of healthcare services. It also consists of the socio-economic factors which might affect the healthcare outcomes of the population. The inter-play of these socio-economic variables together with healthcare services may decide the outcome of health.

The left hand side of the Figure 1.1 consists of the types of outcome caused by the unavailability, inaccessibility or unaffordability of healthcare services. The two types of morbidity include acute illness and chronic illness during last 15 days and last one year respectively. While proportion of death is taken as proxy variable for mortality rate due to unavailability of mortality data at district level. Unavailability, inaccessibility or unaffordability of healthcare services may sometimes lead to death of the person. Being exposed to a particular work environment may also decide the cause of death.

**Fig 1.1 Conceptual Framework**





The same goes for being belonging to a particular social group, engaging in particular occupation or being educated to a certain level which might affect the healthcare access of the people and its outcome.

### **1.10 Introduction to the study area**

Northeastern region is located between 20°N - 29°30'N latitude, and 89°46'E - 97°30' E longitude. The region originally comprised of seven states which are called the 'seven sisters' states and the states being Arunachal Pradesh, Assam, Nagaland, Meghalaya, Mizoram, Manipur and Tripura. Later on when Sikkim became a part of India, it is considered as a part of Northeastern states of India.<sup>66</sup>

Topographically, the region is very harsh and inaccessible and surrounded by hills on three sides. This region is isolated from the rest of India if not for 40 km corridor along 'the Bhutan and Nepal Himalayan foothills'.<sup>67</sup> Road network is very poor in the region and total railway length of just 2592 kms<sup>68</sup> concentrated only in Assam and total road length of just 3,76,819 km.<sup>69</sup> The region has a population of 4.56 crores with population density of 174 persons per sq. km.<sup>70</sup> The region is known for its diverse ethnic groups and cultural practices. Scheduled tribe population is found dominantly in Mizoram (94.4 per cent), Nagaland (86.5 per cent), Arunachal Pradesh (68.8 per cent), Meghalaya (86.1 per cent etc. In fact, there are 32 Schedule Caste and 132 Schedule tribes in the region.<sup>71</sup>

In terms of literacy, almost all the states of the Northeastern region fare far better than India (74.04 percent)<sup>72</sup> except for States like Assam (61.8 percent) and

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<sup>66</sup>Taher, M. & Ahmed, P. (2012). *op. cit.*, p. 1.

<sup>67</sup>*Ibid.*

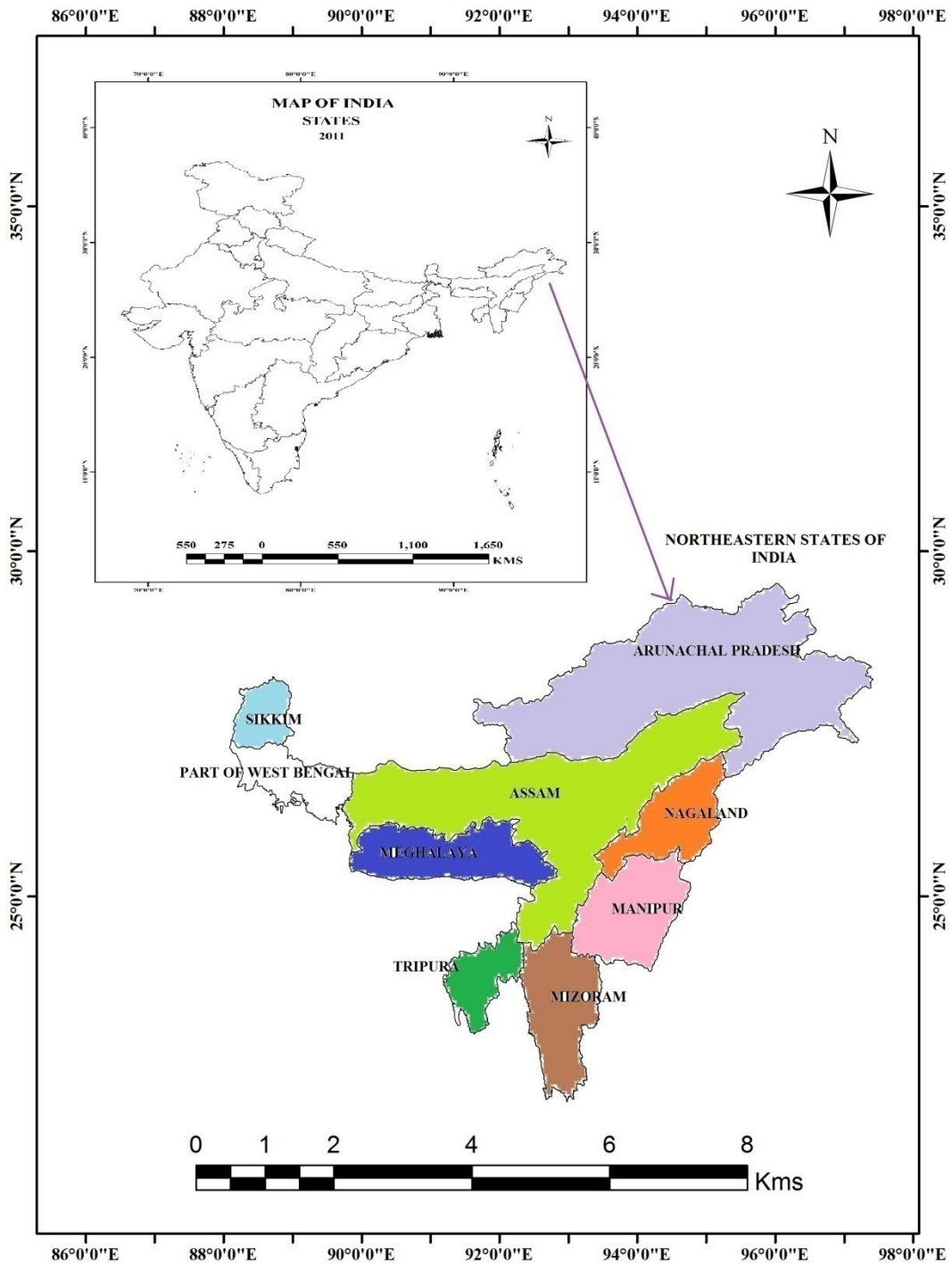
<sup>68</sup>National Transport Development Policy Committee (NTDPC). (2012). The Working Group on Improvement and Development of Transport Infrastructure in the North East for the National Transport Development Policy Committee, Government of India.

<sup>69</sup>Northeastern Council Secretariat. (2015). *Basic Statistics of Northeastern Region 2015*. Government of India.

<sup>70</sup>*Ibid.*, p. xxvii

<sup>71</sup>*Ibid.*, pp. 13-106.

<sup>72</sup>Census of India (2011). Provisional Population totals-India, (101). Retrieved from [http://censusindia.gov.in/2011-prov-results/data\\_files/india/Final\\_PPT\\_2011\\_chapter6.pdf](http://censusindia.gov.in/2011-prov-results/data_files/india/Final_PPT_2011_chapter6.pdf)



Map 1.1 Location map of Northeastern states of India.

Arunachal Pradesh (65.4 per cent) in 2011. Mizoram has the highest literacy rate of 91.33 per cent followed by Tripura (87.22 percent), Sikkim (81.42 per cent). Rest of the states like Nagaland (79.55 percent), Manipur (76.94 per cent) and Meghalaya (74.43 per cent) also perform better than all India level still has to catch up when compared to states like Mizoram, Tripura etc.<sup>73</sup>

There is economic backwardness and large scale unemployment in the region with unemployment rate of 122 persons per 1000 in Sikkim which is the highest in Northeast.<sup>74</sup> The reasons for economic backwardness are general poverty, subsistence economic base, poor irrigation facilities, occurrence of natural hazards, lack of industries, and resources, lack of infrastructural development etc. Lack of employment may be due to lack of technical and vocational education, entrepreneurship etc. However, the most important factor for economic backwardness is the limited spread of banking institutions and also lack of infrastructure facilities in the region.<sup>75</sup>

Meanwhile there are just 11 medical colleges in the region and total number of government hospitals is 1816.<sup>76</sup> Average number of person served per hospital bed in the various states is lowest in Sikkim(406 person per hospital bed)and 555 in Arunachal Pradesh while maximum numbers are served in Assam (2,369 person per hospital bed) and in Manipur (1,776person per hospital bed) as per National Health Profile (2015).<sup>77</sup> Also, in terms of human resources there are huge shortages of specialists as shown by National Health Profile (2015) figures of specialists at CHCs to be one in Arunachal Pradesh, three in Manipur and Meghalaya, zero in Tripura and Sikkim and five in Nagaland.<sup>78</sup>

In terms of morbidity, the region has higher prevalence of acute communicable than chronic non-communicable diseases. For instance, communicable diseases like fever of unknown origin (35.4 per cent), diarrhoea or dysentery (13.1 per cent), gastritis (8.8 per cent) etc had been reported to constitute the highest, second highest and third highest burden of diseases in Northeast India. The high number of prevalence of gastritis is due the tradition of smoking

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<sup>73</sup> Census of India (2011). Retrieved from [www.census2011.co.in/literacy.php](http://www.census2011.co.in/literacy.php)

<sup>74</sup> Northeastern Council Secretariat (2015), *op. cit* p. 272.

<sup>75</sup> Taher & Ahmed (2012), *op. cit.*, pp. 275-279.

<sup>76</sup> Northeastern Council Secretariat (2015), *op.cit.*, p. XXVII.

<sup>77</sup> Central Bureau of Health Intelligence. (2015), *op.cit.*, p. 243.

<sup>78</sup> *Ibid.*, p.208.

and alcohol in the region.<sup>79</sup> Mortality in the northeastern region is high although but lower than the EAG states. The highest under five mortality is reported in Arunachal Pradesh (84.8 per cent) and the lowest in Sikkim (40.1 per cent) in 2007.<sup>80</sup>

## 1.11 Organization of Chapters

As the topic suggest there is a need to state the problem of the study as to why the topic has been chosen and hence it has been laced at chapter one along with the objectives, research questions. Database and Methodology have also been placed there as there is the need to answer the research questions based on certain methodologies. The theoretical framework of the study has been placed at chapter two so as to understand the debate on healthcare, framework upon which healthcare services operate and its influence on healthcare outcome. The following chapter deals with analysis and results. Chapter three deals with analysis of availability, accessibility and affordability of healthcare services of both the physical and human at regional and district level as it form the main part of the topic. The fourth chapter deals with analysis of the link between healthcare services and healthcare outcomes. It also analyses the various factors responsible for differential health care outcome, accessibility, availability at various levels. The fifth chapter deals with summary and conclusions found of the study.

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<sup>79</sup>Nangbam, S. & Ladusingh, L. (2015). Burden of disease and benefit incidence of public health expenditure in Northeast India. *Journal of Health Management*, 17(3), p.330

<sup>80</sup>International Institute for Population Sciences (IIPS) and Macro International (2007). *National Family Health Survey (NFHS-3) 2005–06: India: Volume I*. Mumbai: IIPS.

## Chapter 2

### Literature survey

#### 2.1 A brief history of healthcare system in the world

The present day healthcare system had its roots in the ancient practices of Chinese, Indian, Greeks, Romans, etc medicines which developed through time. The earliest practices of healthcare were traced back to the Ayurvedic and Sidhha system in India. The Ayurvedic system goes back to the migration of the Aryans of the Indus valley and development of the Harappan culture around 2000 B.C.<sup>1</sup>This system had been followed in India for more than 5000 years. Ayurveda literally means the “science by the knowledge of which life can be prolonged or its nature understood” (Susruta as cited by Kutumbiah, 1992).<sup>2</sup> It is a “holistic and traditional system of healthcare”<sup>3</sup>(Altern as cited by Mishra, 2001) which evolved from traditional use of herbs and dietary management into a scientific system.<sup>4</sup>

In 600 B.C. two schools of Ayurveda known as the School of Physicians (the Atreya School) and the School of Surgeons (the Dhanvantari school) were formed. Charak (100-400 AD) was the leader of the Atreya School and brought out the vast practice of Ayurveda in the form of Charak Samhita which defined illness as caused due to “loss of faith in divine and various external causes such as diet, lifestyle and exposure to chemical, physical and biological agents” (Lele as cited by Mishra, 2001).<sup>5</sup> Hence, the Ayurveda aims to prescribe diet, medicines and regimen of life which if embibed in our daily routine will lead to a balance of dhatus (the constituents of the body), help regain the balance in case of a person who had lost it and also to give advice on how to maintain the balance.<sup>6</sup>

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<sup>1</sup>Meade, M.S. and R.J. Earickson, (2005).Medical geography (pp. 312-341).*The Guilford Press*.

<sup>2</sup>Kutumbiah, P. (1992). Ancient Indian Medicine (p. i). New Delhi: Orient Longmans Limited.

<sup>3</sup> Mishra, L.C., Betsy, B. &Dagenais, S. (2001). Ayurveda: A historical perspective and principles of the traditional healthcare system in India. *Alternative Therapies*, 7(2), p. 36.

<sup>4</sup>*Ibid.*, p. 36.

<sup>5</sup>*Ibid.*, pp. 36-37.

<sup>6</sup>Kutumbiah (1992).*op.cit.*,p. xx

The Dhanvantari School which was represented by Susrut Samhita (300-400 BC) which was known for surgery gave a deep insight into the equipments, types of surgery and a complete description of human anatomy covering the areas of bones, nerves, the circulatory system etc (Ray, Gupta & Roy as cited by Mishra, 2001).<sup>7</sup> Infact, modern day surgeons still refers to Indian method of rhinoplasty which was practiced by ancient Indian surgeons.<sup>8</sup>

The Siddha system more or less corresponds to the Ayurvedic system although it originated in south India.<sup>9</sup>“The Siddha medicine was an offshoot of the Siddha yogi’s experiments in yoga and alchemy towards the achievement of an uninterrupted lifespan and an imputrescible body in this world.” It originated with the use of herbs and mineral substances to alleviate the effects of severe yogic practices. The system is known for the changing the base metals into gold and renewing the human body along with correct use of herbal ingredients.<sup>10,11</sup>

Another important system of medicine was the acupuncture system originating during the Chou dynasty (1121-225 B.C.) and the Han Dynasty (206 B.C. – A.D. 221) of China. The special technique of acupuncture was developed by them with the underlying idea of healing the body at different or special points which was stimulated with the help of either heat pressure or needles etc. Other forms of health care practices such as Galenic medicine, Unani and biomedicine all have their origins in Greek medicine. The leading propagator for Greek medicine was Hippocrates who linked diseases with climate and recognized that different types of diseases can be cured by the differing cultural practices and their social institutions.<sup>12</sup>

As a brief history of healthcare system has been explained before the present day healthcare facilities which can be explained three parts which are availability of healthcare facilities, accessibility to healthcare facilities and affordability of healthcare facilities. These three parts are discussed below:

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<sup>7</sup>Mishra, Betsy & Dagenais (2001), *op.cit.* pp. 37-38.

<sup>8</sup> Walker, K. (1995). *The story of medicine* (p. 28). New York: Oxford University Press.

<sup>9</sup>Meade, & Earickson (2005), *op.cit.*, pp. 312-341.

<sup>10</sup>*Ibid.*

<sup>11</sup>Sujatha, V. (2009). The patient as knower: Principle and practice in Siddha medicine. *Economic and Political Weekly*, 44(16), p.78.

<sup>12</sup>Meade, & Earickson (2005), *op.cit.*, pp. 312-341.

## **2.2 Availability of healthcare facilities**

In India, healthcare is available in two forms i.e., public and private facilities. The public facility is provided by the government while the private consist of the vast number of private personnel ranging from big private hospitals to NGO's and trusts to quacks with no medical qualification. However, in terms of availability of healthcare facilities, most of the literatures are dealing with public healthcare facilities. So, studies relating to availability have been organized from public healthcare perspective although the concept of public and private care is explained in details below:

### **2.2.1 Availability as a concept**

Before going into the details of availability of healthcare services, it is important to know the concept of healthcare services itself. The concept has been explained in brief as follows:

According to Last (1983)<sup>13</sup> “Healthcare services are those that are performed by healthcare professionals or by others under their direction, for the purpose of promoting, maintaining, or restoring health. In addition to personal health care, healthcare services include measures for health protection and health education.”

Health services are available in the form of public healthcare and private healthcare in India. The public healthcare services include the services provided via a network of sub-centres, primary health centres and community health centres. These facilities give the services of preventive, curative and promotive care. The services provided in the public health system includes maternal and child healthcare services like the immunization of children between 12-24 months with three doses of DPT vaccine, BCG vaccine, three doses of polio vaccine, providing of pre natal and post natal services etc.<sup>14</sup>

The private facilities provide a range of services covering the institutionalized and non-institutionalized care. No matter how high the cost is even the poor prefer private care services which may be due to the lack of quality of services in public sector or

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<sup>13</sup> Last, J.M. (1983).A Dictionary of Epidemiology (Ed. p.44.) Oxford University Press,

<sup>14</sup>Ministry of Health and Family Welfare. District Level Household Survey-4: District factsheet Bishnupur (2012-13). Mumbai: Indian Institute of Population Studies.

inadequate infrastructure or quality of care provided at private institute.<sup>15</sup> However, the health care services provided at private need not be of better quality than the public care. Rather, private services have made healthcare services as a commodity to be purchased whether it can be afforded or not. Infact, Shapiro (2017)<sup>16</sup> is of the view that healthcare has become a commodity just like luxury goods which cannot be afforded but needed nevertheless. This is based on the argument that healthcare is service provided by third party who needs to be purchased and not given freely. This is because he believes that health is not a right rather a commodity without subsidy from the government. This will in turn create more supply from which a consumer can choose. Demand and supply in healthcare means the healthcare requirement of the people, their choices in seeking healthcare and the available healthcare facilities respectively.<sup>17</sup>

Infact, according to Guagliardo (2004) availability refers to the existing number of healthcare centre at local service from which a consumer can choose. Penchansky and Thomas (1981)<sup>18</sup> defined availability as “The relationship of the volume and type of existing services (and resources) to the clients' volume and types of needs. It refers to the adequacy of the supply of physicians, dentists and other providers; of facilities such as clinics and hospitals; and of specialized programs and services such as mental health and emergency care.” Basically, it means that availability of healthcare is a relationship between the forces of demand and supply.<sup>19</sup> The demand is created by the consumer of healthcare due to illness while the supply is the health facilities and services provided by the public or private healthcare system. However, the demand of healthcare is very less as people have very less choice when confronted with emergency cases and also due to limited information about choices of healthcare available to them.<sup>20</sup> There should be adequate supply of healthcare services and this adequacy is what the authors referred to as availability of healthcare services.

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<sup>15</sup>Bhandhari&Dutta (2007), *op. cit.*, pp. 269-70.

<sup>16</sup> Shapiro, B. (2017, January 11). Health care is a commodity, not a right. *National Review*.Retrived from <http://www.nationalreview.com/article/443737/health-care-industry-markets-work-better-government>

<sup>17</sup> Mooney (1987), *op.cit.*, pp. 296-300

<sup>18</sup>Penchansky, R. & Thomas, W, J. (1981). The concept of access: Definition and relationship to consumer satisfaction. *Medical Care*, XIX, 127-140.

<sup>19</sup>*Ibid.*

<sup>20</sup> Mooney (1987), *op.cit.*, pp. 296-300



### (i) Availability as a concept of public healthcare facilities

Public healthcare facilities encompass the various healthcare facilities provided by the government of India. It evolved from ancient healthcare system to the most modern and efficient healthcare system available in the world today. The earliest plan of this public healthcare system was laid down in India by the Bhore Committee (1946)<sup>21</sup>. Later on followed and emphasized in various committees and plans of the government like the Mudaliar committee (1962), Mukherjee Committee (1956), Kartar Singh Committee (1974), Healthcare facilities means the healthcare provided at various tiers and levels in rural India mostly. The tiers as demarcated by the above mentioned committees and IPHS (2007)<sup>22</sup> can be broadly clubbed under physical healthcare facilities and human resources. The physical healthcare facilities consist of sub centre (SC), primary healthcare centre (PHC) and community healthcare centre (CHC), district Hospital (DH) and government Hospital. The sub-centre occupies the lowest tier in public healthcare system in India today serving about 5000 people in plain areas and 3000 population in hilly/tribal/difficult terrain. It acts as interface with the villages at grass root level.<sup>23</sup>

The primary healthcare centre provides curative and preventive care to the people. It covers about 20,000 population in hilly or tribal region and 30,000 in plain areas.<sup>24</sup> The Community health centres provide specialist services to 1,20,000 populations in plain region and 80,000 populations in hilly or tribal region. It acts as centres for providing specialist care services.<sup>25</sup>

The human resources in SC include one ANM (Auxilliary Nurse and Midwife) and a Multipurpose Health Worker (Male) so as to provide curative and preventive services along with various national health programmes.<sup>26</sup> PHC is looked after by three Medical Officers out of which there should be least one Lady Medical Officer.<sup>27</sup> CHC should have at least four specialists which include surgeon, physician, gynecologists and pediatrician along with 21

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<sup>21</sup> Bhore Committee (1946). *Health and Development Survey, (volume I)*. New Delhi: Government of India, The Manager of Publications.

<sup>22</sup> Directorate General of Health Services (2007). *Indian Public Health Standards (IPHS) For Sub- Centres*. New Delhi: Directorate General of Health Services.

<sup>23</sup> *Ibid.*

<sup>24</sup> Directorate General of Health Services.(2007). *Indian Public Health Standards (IPHS) For Primary Health Centres*. New Delhi: Directorate General of Health Services.

<sup>25</sup> Bhandari & Dutta (2007), *op. cit.*, pp. 265-266.

<sup>26</sup> Directorate General of Health Services.(2007). *op.cit.*, pp.1-10.

<sup>27</sup> Directorate General of Health Services. (2007). *op.cit.*, pp. 9-20.

paramedical and other staff.<sup>28</sup> However, the role of public healthcare in India has been reduced to providing preventive healthcare off late due to decreasing quality of services of the public healthcare system.<sup>29</sup>

### **(ii) Availability as a concept of private healthcare facilities**

The concept of private healthcare facilities has different meanings in the developed and developing countries. In developed countries private healthcare has developed faster than the developing countries to even extend healthcare in the form of health insurance provided by the private bodies.<sup>30</sup> While in developing countries like India private healthcare still means the varied private clinics, hospitals etc. The private sector in India consistof the “non-state service providers” ranging from faith healers and quacks at one extreme of the continuum and super-specialty-corporate hospitals at the other end. It can be further divided into for profit providers like the individual practitioners to private institute, diagnostic centres etc and the not-for-profit providerslike charitable trust, NGO’s etc. The not for profit providers make up less than one per cent of the health service provider in India (Ministry of Health and Family Welfare as cited by India Infrastructure Report, 2014).<sup>31</sup> While, the private practitioner with own enterprises make up about 80 million of the 1.3 million private practitioners in India.<sup>32</sup>

In India private healthcare facilities has been growing at an unregulated manner owing largely to the government trained doctors and nurses who started engaging themselves in private practices and without any regulation over them developed inroads into public healthcare facilities through family connections and use of referral system. At the same time, these practioners were using the subsidized education of the government and also established their private institute using state funds.<sup>33</sup> This may be one of the contributing factors of declining quality of public healthcare system as the doctors tend to dedicate more hours in private practice. Moreover they charge very high prices often pushing the people to the brink

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<sup>28</sup> Bhandari & Dutta (2007), *op. cit.*, pp.265-266.

<sup>29</sup> *Ibid.*, pp. 270-271.

<sup>30</sup> Glied, S. (2009). Mandates and the affordability of healthcare. *Inquiry: The Journal of Health Care Organization, Provision, and Financing*, 46, p. 204.

<sup>31</sup> IDFC Foundation (2014). *India infrastructure report 2013-14: The road to universal health coverage*, New Delhi: *OrientBlackswan*.

<sup>32</sup> *Ibid.*, p. 67.

<sup>33</sup> *Ibid.*, p. 6

of poverty which is carried on through generations.<sup>34</sup> Private practitioners are experiencing boon in their business due to the inadequacy in public healthcare system, crippled by shortage of personnel, absenteeism, lack of financing, large scale corruption etc. However, this has led to unchecked “proliferation of private medical practitioners” which is again harmful for the health sector.<sup>35,36,37</sup> The main reason being luring patients with promise of world class medical facilities while at the same time engaging practitioners who had very low qualification for the job or no qualification at all and charging hefty amount for poor quality care.<sup>38</sup>

In private sector there is a tendency to over treat the rural user group who are illiterate and not aware of the intention of the practitioners. Moreover, they are largely unqualified leading to deterioration of the quality of private practice and healthcare at large.<sup>39</sup>

### 2.2.2 Studies related to availability

Availability of health care facilities has been studied in terms of provider to population ratio for analyzing the efficiency of healthcare services offered to people by Ministry of Health and Family Welfare (2005)<sup>40</sup>. It highlighted that “the ratio between allopathic doctor and population was 1 for 1665 persons in the country (60 doctors for 100, 000 population) while in Australia, Canada, the United Kingdom and the United States of America, it was 249.1, 209.5, 166.5 and 548.9 respectively”.<sup>41</sup> The availability of healthcare facilities have been ensured through the norms lay down by IPHS<sup>42</sup> (2007)<sup>43</sup>.

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<sup>34</sup>Selvaraj, S.& Karan, A. K. (2009). Deepening health insecurity in India: Evidence from national sample surveys since 1980's. *Economic and Political Weekly*, Special Article, XLIV (40), 55-61.

<sup>35</sup> India Infrastructure report (2013-14), *op.cit.*, p. XXXIX

<sup>36</sup>Banerjee, A., Deaton, A. & Duflo, E. (2004). Health care delivery in rural Rajasthan. *Economic and Political Weekly*, 39(9), 944-949.

<sup>37</sup>Bhandari & Dutta (2007), *op. cit.*, pp. 265-285.

<sup>38</sup> India Infrastructure report (2013-14), *op.cit.*, p. XXXIX.

<sup>39</sup>Bhandhari and Dutta (2007), *op. cit.*, p. 271

<sup>40</sup>Ministry of Health and Family Welfare (2005). *Report of the commission on macroeconomics and health*. New Delhi: Government of India.

<sup>41</sup>Ministry of Health and Family Welfare (2005). *op. cit.*, p. 28.

<sup>42</sup> IPHS stands for Indian Public Health System.

<sup>43</sup>Directorate General of Health Services (2007). *op.cit.*, pp. 1-10.

In modern time the norms for earliest known availability of healthcare facilities in India was laid down by Bhore Committee (1946)<sup>44</sup>. The report of the committee endeavored to give a birds' eye view of the health scenario of that time, laid down the framework of healthcare in rural India and made recommendations for future development in health sector. It installed the hierarchical system of healthcare in India ranging from ministry of health at the top to the district level organization consisting of primary and secondary units with norms for facilities and staff numbers in both the long term and short term plan.<sup>45</sup> As per Central Bureau of Health Intelligence (CBHI) (2015)<sup>46</sup>, there were 1,52,326 SC's, 25,020 PHC's and 5,363 CHC's with a shortfall of 13.16 per cent, 18.46 per cent and 40.87 per cent respectively.

Banerjee et al., (2004)<sup>47</sup> through a survey of the Udaipur area of Rajasthan about the healthcare facilities found huge inefficiency on part of the human healthcare facilities. Most of the nurse (45 per cent) were found absent from the Sub-centers and (46 per cent) from Primary Healthcare Centers and Community Healthcare Centers (CHC) during opening hours which indicates that the centers remained closed more than half of the time (56 per cent). The study also found high correlation between worse health and poor quality of healthcare after controlling for demographic characteristics, income and distance factor. There was also correlation between high level of self reported good health and a visit to healthcare facilities as 81 per cent reported that their health improved after their visit to a private facility. It also highlighted that the quality of public service was poor added on by the private practice which was unregulated and provided by poorly qualified practitioners.<sup>48</sup>

The findings of the Banerjee et al.,(2003) has been corroborated by Bhandari & Dutta (2007)<sup>49</sup> who found that there was a huge shortage of both human and physical infrastructure as against the minimal number prescribed by the government. Union Ministry of Health and

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<sup>44</sup> Bhore Committee (1946), *op. cit.*, pp1-24.

<sup>45</sup> *Ibid.*

<sup>46</sup> Central Bureau of Health Intelligence. (2015). *National health profile*, New Delhi: Ministry of Health and Family Welfare.

<sup>47</sup> Banerjee, Deaton & Duflo (2003), *op. cit.*, pp. 326-330.

<sup>48</sup> *Ibid.*, p. 330.

<sup>49</sup> Bhandari & Dutta (2007). *op. cit.*, pp. 265-285.

Family Welfare (UMHFW) (as cited by Bhandari & Dutta, 2007)<sup>50</sup> revealed that there were 146,046 sub centres with 12 per cent, 23,236 primary health centres with a shortfall of 16 per cent, 3,346 community health centres with a shortfall of 50 per cent of the required norm. While in terms of human resources, 49.9 per cent of the sanctioned posts in CHC have remained vacant on 2005. The infrastructure and staff were simply not adequate to provide healthcare services from multiple angles. Furthermore, there was huge unaccountability in public sector.

However, the earlier argument of health facilities having an effect on good health was negated by Datar, Mukherjee & Sood (2007)<sup>51</sup> who said that availability of health care facilities did not lead to much increase in immunization coverage especially so in case of rural health infrastructure. While bigger facilities of health care has much better coverage.

The argument for and against health facilities correlating with health outcomes has been going on with more scholars claiming that health facilities does indeed have a role to play in improving the health status of the people at large. This argument has also been supported by Lakshmi et al., (2013)<sup>52</sup> in their study of health infrastructure of Andhra Pradesh stating that increase in healthcare facilities had a bearing upon the health of the people. The study highlighted that the health infrastructure in terms of availability of Sub centers (SCs), ANM at SC's, Health Assistant (Male) at PHC's, Obstetricians & Gynecologists' at CHCs, Nurse/Midwife at PHCs and CHCs which was more than the actual number required in the then Andhra Pradesh. It concluded that just increasing the infrastructure was not enough and government needs to increase the operational efficiency, efficient utilization and maintenance etc.

A study conducted by Lakshmana (2010)<sup>53</sup> in the state of Karnataka regarding the health infrastructure of the children found that districts like Bagalkot, Bijapur, Haveri and Koppal

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<sup>50</sup> *Ibid.*, pp. 255-266.

<sup>51</sup> Datar, A., Mukherjee, A. & Sood, N. (2007). Health infrastructure & immunization coverage in rural India. *Indian Journal of Medical Research*, 125(1), 31-42.

<sup>52</sup> Lakshmi, S.T. & Sahoo, D. (2013). Health infrastructure and health indicators: The case of Andhra Pradesh, India. *IOSR Journal of Humanities and Social Science*, 6(6), 22-29.

<sup>53</sup> Lakshmana, C.M. (2010). A Study on healthcare infrastructure for children in Karnataka: A district-wise analysis. *Journal of Health Management*, 12(4), 434-437. Retrieved from <http://dx.doi.org/10.1177/097206341001200402>

etc were having high proportion of children with low healthcare infrastructure and districts like Gulbarga, Belgaum and Bellary were having good health care infrastructure despite high proportion of children population. While districts like Bidar and Raichur have moderate healthcare infrastructure with high proportion of child population. In terms of mortality, child and infant mortality were reported in Chitradurga, Mangalore, Bidar, Dakshina Kannada, Gulbarga, Bagalkot, Bijapur and Bellary.<sup>54</sup>

A study conducted by Baru et al., (2010)<sup>55</sup> highlighted the inequities to healthcare services in India across caste, class and region found that public health facilities were vastly unavailable in both rural and urban areas .The unavailability was prominent in the form of infrastructure, doctors and staffs, bed-population ratio as well in the distribution of healthcare facilities. This was found while comparing the states of India with Kerala having the best indicators of health development and outcomes and U.P the worst in both fields. So, inequities were found not just among social groups but also amongst the states.<sup>56</sup>

According to Rao & Raman (2014)<sup>57</sup>“The combined density of allopathic doctors, nurses and midwives (11.9) is about half of the WHO benchmark of 25.4 workers in these categories per 10,000 population for achieving 80 per cent of births attended by skilled personnel in cross-country comparisons”. Even starker picture than the above is revealed when the number of doctors is shown through qualifications per 10,000 which had a proportion of 3.8 doctors per 10,000 populations. This health worker shortfall is manifested in the form of geographical distribution too which is 42 per 10000 urban populations and 10.8 in rural areas.<sup>58</sup>

As per Central Bureau of Health Intelligence (2016)<sup>59</sup> health infrastructure forms an important parameter for comprehending the healthcare delivery facilities and welfare mechanisms in India. It defines health infrastructure under the sub-heading of educational and social infrastructure. “Educational infrastructure includes of all the medical institutes,

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<sup>54</sup> *Ibid.*, pp. 434-437.

<sup>55</sup> Baru, R., Acharya, A., Acharya, S., Kumar, A. K. S. & Nagaraj, K. (2010). Inequities in access to health services in India: Caste, class and region. *Economic and Political Weekly, Special Article, XLV (38)*, 51.

<sup>56</sup> Baru, Acharya, Acharya, Kumar & Nagaraj (2010). *op.cit.*, pp. 47-58.

<sup>57</sup> Rao & Raman (2014), *op.cit.*, p. 253.

<sup>58</sup> *Ibid.*

<sup>59</sup> *Central Bureau of Health Intelligence.(2016). National health profile.New Delhi: Ministry of Health and Family Welfare.*

students admitted to M.B.B.S. course, post graduate / diploma in medical and dental colleges, admission to BDS and MDS courses, AYUSH institutes, nursing courses and paramedical courses.”<sup>60</sup>

A study by Saikia & Das (2014)<sup>61</sup> about the availability of healthcare facilities in Northeast India highlighted the huge human resources shortage in PHC's. Shortages have been recorded in less than two thirds of the PHCs have been carrying out healthcare services with a single doctor. The study found shortage of doctors in PHC's for northeast India where large numbers of PHC's were seen functioning with only one doctor. Also, it highlighted acute shortage of health workers in the form of trained health workers, specialist doctors, nurses or other health workers etc. in Northeast India.<sup>62</sup>

### **2.3 Accessibility of healthcare facilities**

Based on the literature studied, accessibility has been dominated by two main sub- themes which are spatial and non-spatial accessibility. The literature has been organized based upon these two sub-themes with a brief introduction about the two themes.

#### **2.3.1 Accessibility as a concept**

Access to appropriate and adequate healthcare is of essence for good health. Many scholars have pondered upon the definition of access which has still remained ambiguous and ill defined. This has certainly led to ill understanding of the concept of access or accessibility.<sup>63</sup> Access can be defined in various dimensions but it can be broadly understood as barriers that one needs to overcome to get the essential healthcare facilities (Lewis as cited by Khan 1994).<sup>64</sup> According to Kumar (2004)<sup>65</sup> “Access to healthcare services includes many

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<sup>60</sup> *Ibid.*

<sup>61</sup> Sakia, D., & Kalyani, K. D. (2014). Access to public health-care in the rural Northeast India. *The NEHU Journal*, 7(2), p. 90.

<sup>62</sup> Sakia & Das (2014), *op.cit.*, p. 90.

<sup>63</sup> Penchansky and Thomas (1981), *op. cit.*, p. 127.

<sup>64</sup> Khan, A. A. & Bhardwaj, S. M. (1994). Access to health care: A conceptual framework and its relevance to healthcare planning. *Evaluation & The Health Professions*, 17 (1), p. 64.

geographic, economic, cultural and political factors. Among these, geographic access (generally measured in terms of traveling cost) is the most significant factor in the utilization of health services”.

Different dimensions of accessibility have been discussed before. Yet, another definition have been forwarded by Guagliardo (2004)<sup>66</sup> who defined access in ‘stages and dimensions’ which signifies the potential for healthcare and realized potential for healthcare. The healthcare can be realized only when all the barriers to healthcare are overcome. Here lies the crux of access to healthcare or accessibility which is often not actualized.

Accessibility of healthcare has been organized based upon the literatures from two view points; the spatial and non-spatial concepts which are explained below:

#### **(i) Accessibility as a spatial concept**

Access has both spatial and non-spatial (social) dimensions. Spatial dimensions of access means the geographical barrier (distance, topography) one needs to overcome to avail the healthcare facilities be it public, private or others and in turn generating a geographical pattern. The spatial dimension plays a dominant role in northeast as the region is known for rough topography which in turn affects the location of healthcare facilities such as sub-centre, primary health centre, community health centre and district hospital.

Accessibility has always been hampered by the spatial relief of the region as healthcare facilities are unequally located across the space based upon the favorability of the topography. Thus spatial access highlights the vital role played by “geographic barriers between consumer and provider” (Joseph and Phillips as cited by Wang, 2005)<sup>67</sup> “Accessibility is travel impedance (distance or time) between patient location and service points.”<sup>68</sup> While Khan and Bhardwaj (1994)<sup>69</sup> defined spatial accessibility as “Geographic expressions of relative availability or use of health care services”

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<sup>65</sup> Kumar, N. (2004). Changing geographic access to and locational efficiency of health services in two Indian districts between 1981 & 1986. *Social Science and Medicine*, 58(10), 2045-2067.

<sup>66</sup> Guagliardo (2004), *op. cit.*, p. 1.

<sup>67</sup> Wang, F. & Luo, W. (2005). Assessing spatial and non-spatial factors for healthcare access towards an integrated approach to defining health professional shortage areas. *Health & Place*, 1-21.

<sup>68</sup> Guagliardo (2004), *op. cit.*, pp. 1-11.



Accessibility has always been hampered by topography and relief as stated by the above mentioned view points. This is clearly manifested in the northeastern region comprising of 72 mountains, hills and plateau region<sup>70</sup> posing hindrance to the development and construction of road network due to high cost of construction<sup>71</sup> in turn affecting the location and construction of buildings for public healthcare facilities. The absence of proper road itself again make the process of construction difficult and expensive as the construction agencies are plaque by the problems of “accessing construction material, poor quality of roads and unavailability of rail links.”<sup>72</sup> This is supported by the fact that a third of the villages in rural India were not able to access healthcare facilities due to problems of ‘road connectivity’ and inadequate transport services’.<sup>73</sup> This makes it very important to study accessibility of healthcare facilities from the spatial point of view as geography plays a dominating role in Northeastern region of India.

#### (ii) Accessibility as a non spatial concept

Non- spatial concept of accessibility can be simply defined as the non-geographic part comprising of culture, economic, social and political aspect of the people. It also includes other definitions of accessibility as defined by various scholars from time to time. Some of the definitions given by different scholars are discussed below:

Joseph and Phillips (as cited by Wang& Lou,2005)<sup>74</sup> talked about the non-spatial concept of accessibility as “non geographical barriers or facilitators such as social class, income, ethnicity, age, sex”. The social class and ethnicity may play a role in accessing healthcare facilities in the Northeastern region which is known for its’ diverse ethnic and cultural practices. For example, in Manipur itself, there are 33 recognized tribes and all these tribes are further sub-divided into various sub-groups.<sup>75</sup> Furthermore, these ethnic groups have different medicinal practices which may pose hindrance in accessing the modern healthcare

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<sup>69</sup>Khan & Bhardwaj (1994). *op. cit.*, p. 68.

<sup>70</sup>Taher, M. & Ahmed, P. (2012). *Geography of North-East India* (p. 250). Guwahati: Mani Manik Prakash.

<sup>71</sup>National Transport Development Policy Committee (NTDPC) (2012). *Report of the working group on improvement and development of transport infrastructure in the North East for the national transport development policy committee*. Planning Commission, Government of India.

<sup>72</sup>*Ibid.*, p.20.

<sup>73</sup> Sakia & Das (2014), *op.cit.*, p. 90.

<sup>74</sup>Wang & Luo (2005). *op. cit.*, pp.1-21.

<sup>75</sup>[http://www.trimanipur.com/masters/title.aspx?ref=tribes\\_of\\_manipur](http://www.trimanipur.com/masters/title.aspx?ref=tribes_of_manipur)

services. So, the social component of the region posing hindrance to accessibility is not surprising. In fact, Inequalities in access across social groups was shown by Baru et al.,(2010)<sup>76</sup> who found both the factors such as belonging to different social groups and economic factors causing hindrance in accessibility. The main factors being lack of funds, quality healthcare services, unregulated commercialization and rising costs, lack of quality in public and private sector etc affected the inequities in access to healthcare.

In terms of access, gender has also been found to play a crucial role with female usually not been able to get access to healthcare facilities. As the socio-economic status of the women in the household is poor, often they are not aware of the need of healthcare facilities for example during the time of pregnancy, women often did not know that they have to take antenatal care from health facilities. In extreme cases like the HIV infections of both the husband and wife, it is the wife of the house is subjected to neglect and denied access to children and blamed for not being able to control the husband.<sup>77</sup>

The concept of non-spatial as elaborated and explained before has remained more or less the same with scholars explaining the concept in more or less the same line such as economic, social, cultural, political etc. However, Khan and Bhardwaj (1994)<sup>78</sup> included in their definition of non-spatial accessibility, the notion of the “differential availability or use of healthcare resources” in the background of the varied socio-economic and psychological barriers. The psychological barriers to accessibility is more or less linked to the social status of the people which again determines the environment they live in which is usually poor. These create a perception of inaccessibility in their minds (Kopparthy, as cited by Roy, 2004)<sup>79</sup>

The non-spatial component of accessibility dealt only with the non-geographic part. However, accessibility as such cannot be divided that into two water tight compartment of spatial and non-spatial as often it is found that both the factors operate in certain conditions

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<sup>76</sup> Tribal Research Institute, Government of Manipur. Retrieved from [http://www.trimanipur.com/masters/title.aspx?ref=tribes\\_of\\_manipur](http://www.trimanipur.com/masters/title.aspx?ref=tribes_of_manipur)

<sup>77</sup> Mishra, M. (2006). Gendered vulnerabilities: Women’s health and access to healthcare in India. *Centre for Enquiry into Health and Allied Themes*, pp. 26-28.

<sup>78</sup> Khan & Bhardwaj (1994), *op. cit.*, p.68.

<sup>79</sup> Roy et al., (2004). Social inequalities in health and nutrition in selected states. *Economic and Political Weekly*, 667-683.

like the gendered access to healthcare facilities as the distance to healthcare facilities if far from the village. Often, women are denied access to healthcare facilities on this ground by their husbands.<sup>80</sup> So, it is a multidimensional relationship which cannot be studied separately. However, for the sake of convenience of the study, the literatures have been grouped under the spatial and non-spatial ones with few literatures.

### **2.3.2 Studies related to Accessibility**

The studies related to accessibility component of the healthcare facilities has been grouped broadly under two categories for the convenience of the study. The spatial part comprises of the studies dealing with methodology, distance as a factor posing hindrance to accessibility in regions where road facility is poor.

#### **(i) Studies related to spatial accessibility**

Studies relating to spatial accessibility have been organized in two components; studies relating to methodology and studies relating to accessibility in the world.

Guagliardo (2005)<sup>81</sup> conducted a study of the spatial accessibility of primary healthcare in the USA. The study dealt mostly with the different methodologies of measuring spatial accessibility to healthcare. He used and improved upon Guptill's method of gravity and provider ratio method and concluded that methodology for analyzing spatial accessibility have one or the other shortage. He further stated that most of the researches in primary healthcare can be advanced if focused is on finding out the actual impacts of spatial accessibility.

Mackinney et al., (2014)<sup>82</sup> analyzed the literature of healthcare access and recommended that the framework for access should include four dimensions of access which are place, people, provider and payment as basis for healthcare policy. As all the dimensions are interconnected inevitably affecting the outcome, it is desirable for policy makers to deliberate upon the four dimensions while making policy decisions.

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<sup>80</sup>Kundu, S. (2010). Differentials in Health Care Access in India: The Case of MCH Services. *Indian Journal of Gender Studies*, 17(1), 105-133.

<sup>81</sup>Guagliardo (2004), *op. cit.*, p. 1.

<sup>82</sup> Mackinney, A. C., Coburn, A. F., Lundblad, J. P., McBride, T. D., Mueller, K. J. & Watson, S. D. (2014). Access to rural health care: A literature review and new synthesis. *Rural Policy and Research Institute*, 13-14.

Mao et al., (2013)<sup>83</sup> conducted a study to illustrate the method of multiple-mode 2SFCAM<sup>84</sup> in Florida, USA. It used the 2SFCAM and incorporated multiple transportation modes to account for more accurate measurement of accessibility. This was then compared with the traditional single mode 2SFCA and concluded that single mode overestimates accessibility in urban areas where there exist different types of transportation modes. At the same time it underestimates the accessibility in rural areas where the road networks are homogenous. This study overcame the earlier assumption of uniform mode of transportation and provided a more real representation of accessibility through various transport networks.

A study by Shah, Bell & Wilson (2016)<sup>85</sup> of spatial accessibility to family physicians conducted in the urban settings of Canada using 3SFCA<sup>86</sup> method reveals that population residing in the poor neighbourhood in terms of accessibility are also disadvantaged due to their location in poor neighbourhood. They further tend to exhibit the pattern of being located in urban periphery or down town. It also revealed that geographical factor played a role in accessibility both within and among urban areas in terms of PHC services.

Salsberg & Forte (2002)<sup>87</sup> have conducted a study in the rural USA regarding the accessibility of healthcare and come to the conclusion that distance is definitely an impediment in access to healthcare even in the 19<sup>th</sup> century USA and also in rural USA due alarming decline of workforce supply.

Hare & Barcus (2007)<sup>88</sup> conducted a study of geographical accessibility in terms of Kentucky's cardiovascular diseases and hospital services. The study found that people living

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<sup>83</sup>Mao, L. & Nekorchuk, D. (2013). Measuring spatial accessibility to healthcare for populations with multiple transportation modes. *Health & Place*, 24, 115-122.

<sup>84</sup>Shah, T. I., Bell, S. & Wilson, K. (2016). Spatial accessibility to health care services: Identifying under-served neighborhoods in Canadian urban Areas. *Plos One*, p.4. 2SFCA is also known as Two Step Floating Catchment Area Method. The two step floating catchment method places a buffer or catchment around a point of healthcare supply and calculates a provider to population ratio within a coverage approach. Another buffer around the point of population demand is placed and a sum ratio of provider to population within the second buffer. One drawback of this method is the assumption of uniform accessibility within the buffer.

<sup>85</sup>*Ibid.*, pp. 3-14.

<sup>86</sup>*Ibid.*, p. 4. 3SFCA Three Step Floating Catchment Method is an improvement over 2SFCA method. The first and second buffer is the same with the 2SFCA method. Here, a small census unit is being introduced as point of population demand rather than using neighbourhood centroids.

<sup>87</sup>Salsberg, S. & Forte, G. J. (2002). Trends in the physician workforce, 1980-2000. *Health Affairs*, 21(5), 163-173.

<sup>88</sup>Hare, T. S. & Barcus, H. R. (2007). Geographical accessibility and Kentucky's heart-related hospital services. *Applied Geography*, 27(3-4), 181-205.

in far off areas tend to travel for access to healthcare facilities while people living 45 minutes from healthcare facilities are socially and economically marginalized. It also pointed to the fact that areas of low accessibility are more likely to be hospitalized.

Spatial accessibility and efficiency of healthcare services has been carried out by Kumar (2004)<sup>89</sup> in the Rohtak and Bhiwani districts of Haryana between 1981 and 1996 using Location allocation model and logistic regression. The study found that there was not much change in the accessibility in 1981 and 1996 although geographic access to PHC'S has improved from 1981-1996. While locational efficiency has not improved due to factors such as political interventions favouring selective regions at the cost of others. Contrary to the demand of healthcare institute of healthcare tends to be based in more accessible areas and not the inaccessible ones.

As discussed earlier accessibility is the travel time and distance taken to receive healthcare services. However, in case of rural India access is hindered by problems of road connectivity and adequate transportation services. This clearly implies that mere presence of health infrastructure does not mean accessibility to healthcare as about a third of villages in India are found to inaccessible throughout the year.<sup>90</sup> Also, it was found that 18 per cent of the rural population with an ailment did not report any treatment of which 24 per cent comprised of the poorest rural segments while the well to do in rural areas comprised of just 10 per cent(NSSO as cited by Bhandari & Dutta, 2007).<sup>91</sup> The various reasons for not seeking treatment being lack of access which was 12 out of every 100 untreated ,lack of finance made up of 28 out of every 100 untreated in rural areas. Even with emerging private sector catering the needs of the rural areas 28 per cent still remains inaccessible to private sector. It is the government which should take up initiatives to shorten this gap through subsidizing private healthcare or through transfers of fund.<sup>92</sup>

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<sup>89</sup>Kumar (2004), *op. cit.*, pp.1-55.

<sup>90</sup>Bhandari & Dutta (2007), *op. cit.*,p. 267.

<sup>91</sup>*Ibid.*,p. 267.

<sup>92</sup>Bhandari & Dutta (2007), *op. cit.*, pp.267-268.

Saikia & Das (2014)<sup>93</sup> studied the accessibility of public healthcare facilities within the Northeastern states and found that states like Arunachal Pradesh (47.1 per cent), Manipur (51 per cent) and Mizoram (69.4 per cent) had accessibility below the national average of 71.4 per cent in sub-centres. The same case was repeated in accessibility of PHC too with all the states except for Tripura (78.9 per cent) having accessibility below national average of 71.2 per cent. However, the accessibility of CHC with referral transport facility is above national average except for Arunachal Pradesh.

Accessibility and its relationship with spatial and non-spatial factors are complex and multidimensional. Both the factors can determine the accessibility to healthcare facilities. This has been elaborated by a study which highlighted the role of both the spatial and non-spatial factors. This particular study conducted by Dhak (2011)<sup>94</sup> found that accessibility does influence the use of antenatal care services and number of cases of institutional delivery if the healthcare facilities lie within the same village (51.3 per cent). With the increase in distance say 31 km and above the same usage of healthcare services decreases (35.2 per cent). The study also found relative decrease in distance as a controlling factor with the increase in wealth of the people. Thus, the economic factor supercedes the geographical factor to some extent which may not be true in every geographical region like the hilly regions of Northeast dominated by 72 per cent hills, mountains and plateau region.<sup>95</sup> In this light the non-spatial factors influencing the access to healthcare facilities are discussed in the next part.

## **(ii) Studies related to the non-spatial part**

Accessibility as a non-spatial concept in healthcare has been studied in India in mostly from the angle of equity, existing social inequality in the form of caste, class, region and gender biases. For the sake of convenience, the studies dealing with the non-spatial part of accessibility of healthcare facilities have been organized on the basis of socio-economic factors such as the inaccessibility across different social groups, inaccessibility due to

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<sup>93</sup> Saikia, D. & Das, K. K. (2014). Access to public health-care in the rural Northeast India. *The Nehu Journal*, XII(2), p. 96.

<sup>94</sup> Dhak, B. (2011). Use of maternal health care in rural India: Relative importance of socio-economic status and accessibility. *Health & Population Perspectives*, 34(1), 11-18.

<sup>95</sup> Taher & Ahmed (2012). *op. cit.*, p. 250.

economic factor and the vulnerable groups such as women and elderly. The studies are as follows:

India is known for its' diversity of people and their caste, class, religion etc. To study accessibility without studying the literature dealing with inequalities in access to healthcare across an across social groups, the study will be incomplete. Here, the study of Baru et al., (2010)<sup>96</sup> can be taken up, who studied the inequities in access to healthcare across different sections of society and found that factors such as lack of funds, quality healthcare services, unregulated commercialization and rising costs, lack of quality in public and private sector etc affected the inequities in access to healthcare. In fact it was found that the Government of India spending at approximately 19-20 per cent of health expenditure one of the lowest in the world. The study also found that there was huge unaccountability on part of the government as well as consumer groups in regulating the mushrooming growth of unregulated private sectors. There were also huge variations in cost of treatment from public sector to private sector. For example a caesarian section costed INR 50 to 250 in public sector which rose to INR 1792 to 4647 in private.

Accessibility to healthcare facilities can also be hindered by the economic factors such as lack of funds and high cost of treatment as found by the previous study. The same result has been found by Kesterton et al., (2010)<sup>97</sup> while conducting study accessibility to institutional delivery in rural India. The study found that accessibility in terms of healthcare services was affected by financial constraints and not by the unavailability of health workers. It found that the rate of institutional delivery increased from 10-15 per cent households with poorest wealth, education and access to 67 per cent household with highest income.

Kopparthy (1994) (as cited by Roy et al.,2004)<sup>98</sup> in their studies of social inequalities in health across social groups found that the health status of the socially deprived groups are largely hampered by their status in the society as it influences the environment they live in and the kind of cultural exposure, facilities they get. This in turn creates perception upon

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<sup>96</sup>Baru, Acharya, Acharya, Kumar & Nagaraj (2010), *op. cit.*, pp. 49-58.

<sup>97</sup>Kesterton et al., (2010). Institutional delivery in rural India: Relative importance of accessibility and economic status. *BMC Pregnancy and Childbirth*, 2010, p. 6.

<sup>98</sup>Roy et al., (2004). Social inequalities in health and nutrition in selected states, *Economic and Political Weekly*, 667-683.

inaccessibility to healthcare services which is a huge drawback even if the supply side is strengthened there is no strengthening of the demand side. Access is also affected by the groups of people belonging to the poor sections of the society.

Often poverty affects access to the most basic building blocks of health which includes access to healthcare facilities, adequate housing, proper nutrition and being able to be a part of the society (Black & Laughlin as cited by Bartley et al., 2006)<sup>99</sup>. Apart of inaccessibility the poor are also exposed to the unhygienic environment comprised of crowded and damp housing, lack of sanitation. As such they are unable to maintain hygienic environment and prone to infectious diseases making their situation worse (Smith as cited by Bartley et al., 2006).<sup>100</sup>

Rajagopal (2010)<sup>101</sup> in a study found that access to healthcare was determined by one's social status which also reflects one's economic status. The people with higher income opted for private hospital treatment due to ill equipped and crowded government hospitals. While the poor who cannot afford to have better treatment are not able to access the private hospital treatment. Yet the poor wants to have access to private healthcare system owing to its efficiency as a study in the state of Kerala reveals.<sup>102</sup> Also, the poor lacks social capital which may enable them to have greater information regarding certain health behaviors and healthcare services.<sup>103</sup> Infact, another study conducted with composition of 60 per cent daily wgelabourers found that 60 per cent favored private healthcare as their first choice even if they are highly inaccessible and known for good quality services.<sup>104</sup>

Chatterjee (2016)<sup>105</sup> conducted a state level analysis of the access to healthcare services and its' association with healthcare health financing of the government using IPHA<sup>106</sup> and

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<sup>99</sup> Bartley, M., Ferrie, J., & Montgomery, S. (2006). Health and Labour market disadvantage: Unemployment, non-employment & job security. *Social Determinants of Health* (Second edition). *Oxford University Press*, 78-97.

<sup>100</sup> *Ibid.*

<sup>101</sup> Rajagopal, N. (2010). Transformational process of health care choice of poor in Kerala, *Journal of Health Management*, 12(2), 123-135.

<sup>102</sup> Rajagopal (2010), *op. cit.*, pp. 123-135.

<sup>103</sup> Folland, S., Goodman, A. C., & Stano, M. (2013). *The economics of Health and health care* (7<sup>th</sup> ed.). New Jersey: Pearson.

<sup>104</sup> Rajagopal (2010), *op. cit.*, pp. 123-135.

<sup>105</sup> Chatterjee, S. & Laha, A. (2016). Association between public health care access and financing of health infrastructure in India: An interstate analysis. *Journal of Health Management*, 18(2), 258-273.



IPHE<sup>107</sup> indices. It found that states of Himachal Pradesh (0.610), Uttarakhand (0.546), and Kerala (0.437) have the highest accessibility of healthcare services. The least accessible state was found to be Uttar Pradesh (20th) with an IPHA value of 0.024 and 0.194. The study also found that accessibility to health care services was positively correlated with health care financing by the government with Uttar Pradesh having the least finance. This means government should spend more so as to increase accessibility of the health care facilities to the masses.

In India, studies on accessibility are based mostly on socio-economic indicators. The reason may solely be the more the critical role played by social factors in accessing healthcare facilities. Iyer et al., (2007)<sup>108</sup> conducted a conducted based upon primary cross-sectional household survey conducted in the poor agrarian region of South India conducted in 2002. It found evidences of gender biases bias in case of non-treatment of diseases which was found among both poor and non-poor women. It was found that the “Women were three times more likely than men to never treat their illness (odd ratio (OR) 3.23); the poor were 1.55 times more likely to never treat than the non-poor.”<sup>109</sup>

Gender based studies on disparity to healthcare access has also been undertaken by Kundu (2010)<sup>110</sup> compared the rural-urban disparities in access to healthcare services and the impact of the health conditions of the mother upon their children. The study found that there were widespread disparities amongst the gender, in rural and urban women both in terms immunization, seeking private and public health care at different stages like antenatal care, post antenatal care etc. In terms of immunization there was widespread disparity with girls always less than 1 to 2 per cent less immunized than the boys. While in terms of antenatal care it was found that 54 per cent women opt for private care, 46 per cent for government care. While in rural areas 39 per cent goes for antenatal care and 61 per cent on government

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<sup>106</sup>IPHA index basically means index for healthcare access and comprises of two dimensions of public healthcare access i.e., availability of healthcare institute per 10million population and usage of health service (infant stability rate).

<sup>107</sup>IPHE means index on healthcare expenditure and also comprises of two dimensions per capita state government expenditure and per capita central government expenditure on health across states of India.

<sup>108</sup>Iyer, A., Sen, G. & George, A. (2007). Healthcare: Evidence from rural Karnataka, India. *International Journal of Health services*, 537-540.

<sup>109</sup>*Ibid.*, p. 545.

<sup>110</sup> Kundu (2010), *op.cit.*, pp. 105-133

facilities. A deeper study of the reasons for opting for not treatment reveals that 27.1 per cent women in urban area have problem accessing healthcare facilities which goes as high as 56.1 per cent in rural areas .Amongst the various reason 33.2 per cent of female populace in rural area cited distance, lack of transportation facilities (30.8 per cent) which was the most common there. Other problem includes lack of female staff as often women were not permitted by their husbands to visit health care facilities, inability to afford treatment (21.2 per cent in rural areas and 8.3 per cent in urban areas).<sup>111</sup>

Another gender based studies in terms of access to health care has been addressed by Mishra (2006)<sup>112</sup> who stated that women are highly dependent upon their household due to low level of education, low exposure to mass media, limited mobility etc. They are so unaware of even the need of antenatal care at the time of pregnancy. At such situations if women depend upon their family for cure at the time of illness and for resources, there can be instances of favouring the males against the females of the households. The most prominent example is the case where the son of the household and the daughter-in-law has been affected by HIV/AIDS. In such cases, “The daughter-in –law can be discriminatory practices like refusal of shelter, denial of household property, denial of access to the children, being blamed for the husband’s HIV positive status”<sup>113</sup>

Meanwhile Dey et al., (2012)<sup>114</sup> found through their studies of health of the elderly in India found that physical barrier to access goes on increasing solely because these group of people are mostly confined to their homes. They also stated that physical inaccessibility increases cross inaccessible areas. At the same time social factors also decides who has more access and who does not among the elderly.

Most of the literatures dealing with healthcare have a tendency to neglect the northeastern states of India which makes it even harder to assess the actual condition of healthcare accessibility in the region. However, very few literatures available have pointed to the

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<sup>111</sup> Kundu (2010), *op.cit.*, pp. 105-133.

<sup>112</sup> Mishra (2006), *op.cit.*, pp. 26-28.

<sup>113</sup> *Ibid.*, pp. 27-28.

<sup>114</sup> Dey, S., Nambiar, D., Lakshmi, J.K., Sheikh, K. & Reddy, K.S.(2012). Health of the Elderly in India: Challenges of access and affordability. In J. P. Smith and M.Majmundar (Ed.), *Aging in Asia: findings from new and emerging data initiatives* (pp. 377-378). Washington (DC): The National Academies Press.

constraints due to socio-economic factors. But a study conducted by Saikia & Das (2014)<sup>115</sup> have dealt with accessibility as a distance to provider factor state level which needs to be studied further in terms of the geographical factors causing hindrance to accessibility in different regions and districts of Northeast India.

## 2.4 Affordability of healthcare facilities

### 2.4.1 Affordability as a concept

For understanding affordability of healthcare facilities, a basic understanding of the concept of affordability is needed. It simply means the ability or measure to pay for certain goods or services without making huge sacrifices.<sup>116</sup> Accordingly, healthcare affordability as defined by Axene (2003)<sup>117</sup> means “Whether a person or organization has sufficient income to pay for or provide for healthcare costs. This cost could be insurance premiums or direct healthcare service costs.” In Indian context, this could be the measure to pay for seeking treatment at health care centres of either public or private. However, it had been found that huge out of pocket expenditure occurs on treatment ultimately resulting in catastrophic expenditure in India.<sup>118</sup> Effort to increase affordability of healthcare facilities through reduction in out of pocket expenditure is one of the important goals of the WHO universal coverage of health (2010)<sup>119</sup> and also the National health policy of India (2017)<sup>120</sup>.

The WHO (2010)<sup>121</sup> talked about making healthcare affordable through initiatives to make universal access to healthcare which will provide promotive, palliative and preventive care etc. This effort has been seen in the policies and programmes of the British government, US government, Indian government etc.

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<sup>115</sup> Sakia & Das (2014), *op. cit.*, pp. 92-97.

<sup>116</sup> Axene, D.V. (2003). Health Care Affordability: A valuable concept in understanding our health care system challenges, *Health Section News*, 45, p.1.

<sup>117</sup> *Ibid.*

<sup>118</sup> Dey et al. (2012), *op.cit.*, pp. 373-374.

<sup>119</sup> WHO (2010). The world health report 2010: Health systems financing: The path to universal coverage (p. 12). Geneva: World Health Organization. Retrieved from: [http://www.who.int/whr/2010/whr10\\_en.pdf](http://www.who.int/whr/2010/whr10_en.pdf).

<sup>120</sup> Ministry of Health and Family Welfare (2017). *National Health Policy of India*. New Delhi: Government of India.

<sup>121</sup> WHO (2010), *op. cit.* p.12

The British government introduced the National Health Service programme in 1946.<sup>122</sup> The service is funded by ‘general taxation, insurance money, user charges and other sources of income’. It aims to provide free health service to almost all the English patients with charges of £ 7.40 while the patients from Scotland, Wales and Northern Ireland are treated freely. Thus, the healthcare services in United Kingdom were made affordable for the people. However, one major criticism of the programme is the long waiting line of patients which often leads the ‘participants to either postpone or simply not purchase the services’. However, efforts are being made to reduce the waiting time to 18 weeks in 2011 and offers for suitable alternatives to the service.<sup>123</sup>

We have seen the effort to ensure affordability of health care services in the UK. Another country which has made effort to ensure affordability of healthcare services is the USA. The US government has taken up certain initiatives for the coverage of the people through highly subsidized mode such as the Medicare, Medicaid and Patient Protection and Affordable Care Act (PPACA, 2010). However, off late the cost of social insurance have grown out of control and with the PPACA making insurance coverage compulsory the question of affordability arises in USA.<sup>124</sup>

In the light of above situation, affordability of healthcare insurance needs to be defined. Scholars like Penchansky and Thomas (1981)<sup>125</sup> have defined affordability as “The relationship of prices of services and providers’ insurance or deposit requirements to the clients’ income, ability to pay, and existing health insurance.” Not just price of service provided but also the perception of the worth of the price paid, patients idea about the prices, total cost and arrangement of credit if need be also determines affordability.

Affordability can be defined in normative term which means for a normal good, there is a tendency to buy more of it with the increase in income. While the concept of affordability to buy healthcare insurance by those who can afford but spend money instead on other goods of merit, those who cannot pay for it but still buys the healthcare insurance at the stake of

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<sup>122</sup>Folland, S., Goodman, A., &Stano, M. (2013). *The Economics of Health and Health Care* (7th ed., pp. 469-472). New Jersey: Pearson.

<sup>123</sup>*Ibid.*, pp. 469-472

<sup>124</sup>*Ibid.*, pp. 438-439.

<sup>125</sup> Penchansky & Thomas (1981), *op. cit.*, p. 127.

household properties, and others who cannot at all pay for the health insurance have also come to dominate the health research in the U.S.A.<sup>126</sup>

In India, affordability of healthcare has been to some extent insured by the government through the public health initiatives such as the public health system such as sub-centres, primary health centres and community health centres and various schemes of financial aid provided by the government such as the JananiSurakshanaYojana (JSY)<sup>127</sup>, RashtriyaArogyaNidhi (RAN) Scheme<sup>128</sup>. Affordability has varied meanings and can be defined in multiple dimensions and hence it calls for some basic understanding of the concept.

The most basic definition of affordability is that of the ability and willingness to pay. Often the debate of affordability has been occupied by the Willingness to Pay (WTF) and Ability to Pay (ATF)<sup>129, 130</sup>. Researchers have equated willingness to pay with ability to pay which is not always the case as studies conducted from different parts of the world have proved that sometimes people who cannot afford to pay for the medical expenses so as to save the lives of their loved ones, selling off their assets. This type of payment medical fees is due to willingness to pay not ability to pay. For instance in Thailand, a woman sold off her marriage gold, household possessions for the treatment of her paralyzed husband (Pryer, J. as cited by Russell, 1996).<sup>131</sup>

#### 2.4.2 Studies related to Affordability

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<sup>126</sup> Glied (2009), *op.cit.*, p. 204.

<sup>127</sup> JSY also known as Janani Suraksha Yojana is a safe motherhood intervention under the National Health Mission (NHM) being implemented with the objective of reducing maternal and neo-natal mortality by promoting institutional delivery among the poor pregnant women. Retrieved from <https://india.gov.in/information-about-janani-suraksha-yojana>

<sup>128</sup> RAN or RashtriyaArogyaNidhi (RAN) Scheme provided by the Ministry of Health and Family Welfare. The Scheme in provides financial assistance to poor patients. Only persons below the poverty line suffering from specified life threatening disease can avail the Scheme. Accessed from <https://india.gov.in/rashtriya-arogya-nidhi-scheme-ministry-health-and-family-welfare>

<sup>129</sup> *Ibid.*, p 207.

<sup>130</sup> Russell, S. (1996). Ability to pay for health care. *Health Policy and Planning*, 11(3), 219-237.

<sup>131</sup> *Ibid.*, p. 219

Soucat et al., (1997)<sup>132</sup> conducted the “Bamako Initiative” experience in Benin and Guinea to assess the affordability, efficiency and cost –effectiveness of Primary Health Care. The study covering more than 200 Primary health centres in both the regions found that due to the adoption of low cost strategies and effective management of resources, the cost of PHC has remained affordable.

While in the U.S.A affordability to healthcare has altogether a different meaning. With various healthcare insurance initiatives taken up like the Medicare (1965) and Medicaid (1965)<sup>133</sup> and the passing of the Massachusetts mandate in 2006<sup>134</sup> which made it compulsory for every employed individual to be covered by health insurance. It has come to be connoted with affordability to health insurance especially in Massachusetts area where everyone is supposed to be covered by health insurance. It seeks to ensure universal coverage of health which is every individual’s responsibility. The present study conducted into the affordability of the health insurance has to come conclusion that these insurance will only be affordable when there is a set standard for premiums and out of pocket expenditure. It has found that people falling under the bracket of low income groups spends higher percentage of their monthly income upon the premiums than the middle and upper income groups. Also, the burden of insurance is even more in private insurance. It suggested that the standard for the premiums should be based upon the income of the middle income group which will ensure acceptance amongst the middle class people.<sup>135</sup>

Another study found that financial burden of healthcare between 2001 and 2004 rose from 15.9 per cent to 17.7 per cent among the adult population in U.S.A .Also out of pocket expenditure increased by 16 per cent during these period which was mainly contributed by private insurance spending. The study suggested cost sharing between the state and the federal provinces as an alternative to reduce the financial burden amongst the people.<sup>136</sup>

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<sup>132</sup>Soucat et al., (1997). Affordability, cost-effectiveness and efficiency of primary health centre: The Bamako initiative in Benin and Guinea. *International Journal of Planning Management*, 12(1), 81-108.

<sup>133</sup>Folland, Goodman, &Stano (2013), *op. cit.*, pp. 469-472.

<sup>134</sup> Glied (2009), *op.cit.*, p. 204.

<sup>135</sup>Blumberg, et al., (2007).Setting a standard of affordability for health insurance coverage.*HealthAffairs*, 26(4),463-473.

<sup>136</sup>Banthin, J. S., Cunningham, P. & Bernard, D. M. (2008).Financial burden of health care, 2001–2004. *Health Affairs*, 27(1),188-195.

In India affordability of healthcare research has been dominated by out of pocket expenditure or burden of expenditure. Sakthivel (2009)<sup>137</sup> have shown that the burden of expenditure incurred on healthcare services is INR 214 and INR 285 for outpatient care in government facilities and private facilities respectively .While hospitalization expenditure incurred was around INR 9000 and INR 4000 per episode in private and government sector respectively.

In another study Duggal (as cited by Dey et al., 2012)<sup>138</sup> that despite all kinds of health facilities being made available to the public, 83 per cent of the healthcare expenses are private out of pocket expenditure .This clearly shows that healthcare cost are unaffordable by the people and most of them end up spending more than their family expenditure plunging them to impoverishment. For instance there was an increase in absolute numbers of poor form 26 million in 1993-94 to 2004-05. The unaffordability of healthcare services have affected cancer patients and their families the most who often have to travel for treatment adding to the already expensive treatment prolonging throughout the lifetime of the patients. This often leads to catastrophic expenditures that affect the family members in varied dimensions and spheres. For instance: Pramesh et al., (2014)<sup>139</sup> conducted a study on public expenditure on cancer in India and found that the public expenditure on cancer was very low as compared to the U.S.A which is less than US\$10 per person and US\$100 per person in India and the U.S.A respectively. While the out of pocket expenditure accounts for more than three-quarters of the money spent on cancer treatment in India. This calls for a better sharing of cancer treatment cost between the patient and the government in India so as to reduce unhealthy expenditure and impoverishment. This will ensure equitable and affordable cancer care in India.

In Northeast India marked by inaccessibility and poor economic development, it is found that that the out of pocket health expenditure rises stridently with the increase in wealth quintiles for both outpatient and inpatient treatment. It is also found that the treatment expenditure increases for outpatient treatment in rural areas which is the opposite in urban areas. Also, in the states of Nagaland, Mizoram and Sikkim the health care expenses afforded by the

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<sup>137</sup> Sakthivel (2009), *op. cit.*, pp. 57-58.

<sup>138</sup> Dey et al. (2012), *op. cit.*, pp. 373-374.

<sup>139</sup>Pramesh et al., (2014).Delivery of affordable and equitable cancer care in India. *The LancetOncology*, 15(6), 223-233.

government facilities accounts to about 78, 77 and 72 per cent respectively. While in Assam and Tripura, the OOP expenditure accounts for 79 and 78 per cent respectively. In rest of the northeastern states there is not much difference in out of pocket expenditure and the share of the public expenditure.<sup>140</sup>

Ghosh (2011)<sup>141</sup> analyzed the NSSO (1993-94 and 2004-05) consumption expenditure data and found increase in catastrophic healthcare expenditure incidence from 13.1 per cent in 1993-94 to about 15.4 per cent in 2004-05 (OOP > 10 per cent). It also found that “the catastrophic headcount was more than 4 per cent even at the highest defined threshold level (OOP > 25 per cent) in 2004-05”.<sup>142</sup> While the people who were pushed into poverty on account of health expenditure increased from 4 per cent in 1993-94 to 4.4 per cent in 2004-05 due to healthcare.

Flores et al., (2008)<sup>143</sup> found “the financial burden of inpatient care for the uninsured population is substantial, particularly in rural areas. For those hospitalized, on average, OOP payments account for 11 and 9 per cent of total annual household expenditures (APCE) in rural and urban areas, respectively.” It also found the cases of catastrophic expenditure (10 per cent taken as threshold) of the hospitalized group to be that of 34 per cent households in rural areas while it was 30 per cent households in urban areas.<sup>144</sup>

## 2.5 Health Outcome

Healthcare outcomes have been described as “measures of the end result of what happens to patients as a consequence of their encounter(s) with the healthcare system” (Krousel –Wood

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<sup>140</sup>Nangbam, S. & Laishram, L. (2015). Burden of disease and benefit incidence of public health expenditure in Northeast India. *Journal of Health Management*, 17(3), 328-338.

<sup>141</sup>Ghosh, S. (2011). Catastrophic payments and impoverishment due to out of pocket health spending. *Economic and Political Weekly*, 46(47), p.68.

<sup>142</sup>*Ibid.*, p. 68.

<sup>143</sup>Flores, G., Krishnakumar, J., O'Donnell, O. & Doorslaer, E.V. (2008). Coping with health care cost: Implications for the measurement of catastrophic expenditures and poverty. *Health Economics*, 17, p. 1404.

<sup>144</sup>*Ibid.*, p. 1408.



as cited by Krousel-Wood, 1999).<sup>145</sup> Accordingly, studying outcomes helps in generating a pattern which can be used in ranking the effectiveness of healthcare facilities.<sup>146</sup>

Outcome indicator has an edge over process indicator for measuring healthcare performance as outcomes are what physicians, clinicians, patients, public health officials and policy makers are looking for.<sup>147</sup>

Healthcare outcome can be assessed using various indicators like morbidity rate, mortality rate, utilization of healthcare facilities. In this study two outcome indicator, morbidity prevalence and number of deaths as proxy for mortality will be taken in the chapters dealing on analysis of health outcome. Before that a brief introduction of the concept of both the indicators is needed.

### **2.5.1 Concept of Morbidity**

Morbidity is the prevalence of diseases in a group of population. Morbidity as a concept has been changing from time to time with different concepts being put by different scholars. Some of the definitions are discussed below:

According to Thomas (2016)<sup>148</sup> “Morbidity refers to the level of sickness and disability characterizing a population. The term “morbidity” (and its root “morbid”) is derived from the Latin “morbus” for disease and “morbidus” for diseased. It also means the state of being ill, diseased or disabled. It may refer to a person or a group which basically refers to the health status of an individual in the first case and that of a population in the second case.<sup>149</sup>

Last (1983)<sup>150</sup> defined morbidity as “any departure, subjective or objective, from a state of physiological or psychological well-being. In practice, morbidity encompasses disease,

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<sup>145</sup>Krousel-Wood, M, A. (1999). Practical considerations in the measurement of outcomes in healthcare. *Ochsner Journal*, 1(4), pp. 187-194.

<sup>146</sup>*Ibid.*

<sup>147</sup>Schneider, E.C. (2002). Measuring outcomes to improve health care: Rational use of ratings and rankings. *Medical care*, 40(1), p. 1.

<sup>148</sup> Thomas, R.K. (2016). Basic concepts in morbidity analysis (p. 10). *In Sickness and in Health*. Applied Demography, Series 6. New York: Springer.

<sup>149</sup> Thomas, R.K. (2016), *op. cit.*, p. 10.

<sup>150</sup> Last (1983), *op. cit.*, p. 64.

injury, and disability.” In addition to the person who is already ill the period of illness can also be used to describe morbidity.

Morbidity as a conventional definition and its’ types and has been discussed above. But, based upon the literature dealing with morbidity, two themes of morbidity have emerged which is communicable and non-communicable diseases and self-reported morbidity and recorded morbidity. Although both the themes are inter-connected with one theme coming under the other, they have been explained separately for the convenience of the study.

### **(i) Communicable and Non-communicable diseases**

A communicable disease is one that is spread from one person to another through a variety of ways that include: contact with blood and bodily fluids; breathing in an airborne virus; or by being bitten by an insect.<sup>151</sup> Some of the communicable diseases listed under the ICD 10<sup>th</sup>(2016)<sup>152</sup> classification of communicable diseases are “Intestinal infections, tuberculosis, malaria, other bacterial diseases, viral hepatitis, HIV, protozoal diseases, viral infections by skin and mucous membrane lesions, etc”. Communicable diseases outbreaks mostly occur in the aftermath of a natural disaster such as flood, tsunami, earthquakes etc. “The risk of outbreaks is associated with the size, health status and living conditions of the population displaced by the natural disaster. Crowding, inadequate water and sanitation, and poor access to health services, often characteristic of sudden population displacement, increase the risk of communicable disease transmission.<sup>153</sup>

India had already faced multitude of natural disasters like the Assam floods (2012), Uttarakhand floods (2012), cyclones (Cyclone Phailin, 2013), Uttarakhand and Himachal Pradesh landslides (2013) etc.<sup>154</sup> In these aftermath, the outbreak of diseases is very common due to crowding lack of sanitation, poor access to healthcare services as mentioned before.

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<sup>151</sup>Alameda County Public Health Department. Accessed on 06/07/2017 Retrieved from <http://www.acphd.org/communicable-disease.aspx>

<sup>152</sup>International Statistical Classification of Diseases and Related Health Problems 10th Revision (2016) Retrieved from <http://apps.who.int/classifications/icd10/browse/2016/en#/1>

<sup>153</sup>WHO (2006).Communicable diseases following natural disasters: Risk assessment and priority interventions Retrieved from [http://www.who.int/diseasecontrol\\_emergencies/guidelines/CD\\_Disasters\\_26\\_06.pdf?ua=1](http://www.who.int/diseasecontrol_emergencies/guidelines/CD_Disasters_26_06.pdf?ua=1)

<sup>154</sup>National Disaster Management Authority of India. Retrieved from <http://www.ndma.gov.in/en/disaster-data-statistics.html>

For example, in the aftermath of super cyclone in Orissa in 1999, an epidemiological study<sup>155</sup> conducted found the outbreak of *V. cholera* O1 among the hospitalized cases with acute diarrhoea. It had claimed 81 lives with 97000 attacks. The study found the lack of drinking water and poor sanitation to be the main cause of the diarrhoeal outbreaks. The same logic can be applied in regions like the Northeastern states of India where there are frequent floods caused due to excessive rainfall will be followed in most cases by outbreak of disease.

“Non-communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioral factors. Non-communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioral factors” (WHO, 2017)<sup>156</sup> About 70 per cent of deaths each year are caused by non-communicable diseases as per WHO (2017) with cardiovascular diseases, respiratory diseases and diabetes accounting for 80 per cent of the deaths.

In India, there has been rapid expansion of chronic diseases especially among the 4-60 years age group. The main non-communicable according to Arokiasamy & Yadav (2013)<sup>157</sup> are cardiovascular disease, diabetes, bronchial asthma, disorders of joints and bones etc.

## **(ii) Self-reported morbidity and observed morbidity**

Self-reported morbidity and observed or recorded morbidity have been defined by scholars like Sen (2002) and Murray & Chen (1992). They are explained as follows:

According to Sen (2002) “The self-reported morbidity means a person’s own understanding of his or her health which may accord with the appraisal of medical experts.” In other words, it is the internal views of health which is based on patients’ own perception. Observed morbidity is the type of illness which is diagnosed by the external view of a doctor or

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<sup>155</sup> Chhotray, G. P., Pal, B. B., Khuntia, H. K., Chowdhury, N. R. & Nair, G. B. (2002). Incidence and molecular analysis of *Vibrio cholera* associated with cholera outbreak subsequent to the super cyclone in Orissa, India. *Epidemiol Infect.* 128, 131-138.

<sup>156</sup> WHO Accessed on 06/07/2017. Retrieved from <http://www.who.int/mediacentre/factsheets/fs355/en/>

<sup>157</sup> Arokiasamy, P. & Yadav, S. (2013). Changing age patterns of morbidity vis –a-vis mortality in India. *Journal of Biosocial Science*, 46, 462-479.

pathologist.<sup>158</sup> Self reported can be extremely misleading as the patients' internal assessment can be limited by his or her social experience.

Another scholar Murray and Chen (1992)<sup>159</sup> have tried to define self reported morbidity in the form of self perceived morbidity which refers to “the measures that are perceived and reported by an individual, usually in response to inquiries regarding illness. It can be grouped into four categories: symptoms and impairments, functional disability, handicap, and health service use.”

Observed morbidity according to Murray and Chen (1992) can be divided into four categories: “physical and vital signs, physiological and pathophysiological indicators, functional tests, and clinical diagnosis.”<sup>160</sup> However, physical and vital signs observation are expensive and reliability depends upon the skills of the physician. Meanwhile, physiological and pathophysical observations consists of laboratory test such as blood test, urine test, diagnostic imaging such as x-ray, radiography. Functional test includes test on one's ability to do running, lifting weights, intellectual exercises etc. The last clinical test is a thorough examination based on numerous tests conducted and on the basis of signs and symptoms. This is the most popular form of diagnosis or treatment of morbidity.<sup>161</sup>

National Sample Survey 71<sup>st</sup> Round (2015)<sup>162</sup> on ‘Social Consumption of health’ reports morbidity as self reported and observed morbidity such on have also included self-reported morbidity in the form of ‘proportion of ailing persons during last 15 days’ and of chronic illness persisting for more than a month in last one year.

## 2.5.2 Studies related to morbidity

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<sup>158</sup> Sen, A. (2002). Health: Perception versus observation: Self reported morbidity has severe limitations and can be extremely misleading. *British Medical Journal*, 324(7342), p. 860.

<sup>159</sup> Murray, C. J. L. & Chen, L. C. (1992). Understanding morbidity change. *Population and Development Review*, 18(3), 481-486.

<sup>160</sup> Murray & Chen (1992), *op. cit.*, pp. 485-488.

<sup>161</sup> *Ibid.* pp. 50-51.

<sup>162</sup> National Sample Survey Office (2015). Key indicators of social consumption of health. New Delhi: Government of India.

Based upon the literatures studied, two broad themes have emerged in study of morbidity which are communicable and non-communicable diseases and self-reported and observed morbidity. Those studies which do not come under both the category are grouped under the other category such as maternal morbidity, reproductive morbidity and morbidity related to ill- health etc. They are discussed in detail below:

**(i) Studies related to communicable and non-communicable diseases**

India have always been plagued by communicable diseases as reported by the Bhore committee survey (1946)<sup>163</sup> conducted in the then British India. It was the earliest study conducted in India which highlighted the prevalence of communicable diseases like fevers (58.4 per cent), respiratory diseases (7.6 per cent), dysentery (4.2 per cent) and cholera (2.4 per cent) afflicted the population of those times.

In the same pattern as above studies conducted in the late 1990's showed that India was grappling with communicable and waterborne diseases as against non-communicable diseases. Outpatient care reported higher communicable diseases caused through water, hereditary etc. Gender wise, females were reported to be treated more for sickness than males. While age wise comparisons showed higher incidence of morbidity in 0-20 years as compared to 80-100 years.<sup>164</sup>

Arokiasamy & Yadav (2013)<sup>165</sup> in their study highlighted the prevalence of non - communicable diseases showing a significant increase in morbidity prevalence from 1986/1987-2004 with stark rise in the period 1995/96-2004. There was a surprise increase in chronic diseases amongst the adult ages 40-60 such as cardiovascular diseases, diabetes, bronchial asthma, disorders of joints and bones etc. This study also revealed a faster

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<sup>163</sup> Bhore Committee (1946). *op. cit.*, p. 10.

<sup>164</sup> Sekhar, P. S. (1997). Levels of morbidity in Andhra Pradesh. *Economic and Political Weekly, Special Article*, 29, 663-672.

<sup>165</sup> Arokiasamy, P. & Yadav, S. (2013). Changing age patterns of morbidity vis –a-vis mortality in India. *J. Biosoc. Sci.* 46, 462-479.

transition into chronic disease from early ages as compared to developed countries. Overall there was expansion of morbidity in India especially amongst older age groups.<sup>166</sup>

A picture of prevalence of communicable diseases in India has been portrayed above and this calls for the need to analyze prevalence of communicable and non-communicable diseases in the topographically cut-off portion of India i.e., the northeastern part of India. A study conducted by Nangbam & Ladusingh (2015)<sup>167</sup> in rural northeast found that the burden of diseases was dominated by communicable diseases like fever (13 per cent), diarrhoea or dysentery (14.3 per cent), respiratory diseases (7.9 per cent) etc. While others diseases like gastritis (8.8per cent), disorders of joints and muscles (6.4 per cent) also forms a part of the disease burden. It pointed to the fact that the culture of smoking bidis amongst the elderly women along with regular drinking of alcohol and tobacco consumption by the males have contributed to the disease burden in rural northeast. While in Urban northeast the pattern of morbidity is dominated by a mix of communicable and non-communicable.<sup>168</sup>

The above culture of tobacco smoking is corroborated by Rani et al., (2003)<sup>169</sup> in their study which found that “thirty per cent of the population 15 years or older- 47 per cent men and 14 per cent of women- either smoked or chewed tobacco, which translates to almost 195 million people- 154 million men and 41million women in India”. This even increases amongst the people who are less educated, scheduled castes, scheduled tribes etc.

## **(ii) Studies related to self-reported morbidity and observed morbidity**

There is growing trend to study morbidity in the form of self-reported morbidity and observed morbidity. This may be because of the fact that most studies are based on NSSO data (71st round, 2015)<sup>170</sup> which reports morbidity in the form of ailment during last 15 days and 365 days. The NSSO data also provides cases of hospitalized and non-

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<sup>166</sup> Arokiasamy & Yadav (2013), *op. cit.*, pp. 462-479.

<sup>167</sup> Nangbam & Ladusingh (2015), *op. cit.*, p. 331.

<sup>168</sup> *Ibid.*

<sup>169</sup> Rani, M., Bonu, S., Jha, P., Nguyen, S.N & Jamjoum, L., (2003). Tobacco use in India: Prevalence and predictors of smoking and chewing in a national cross sectional household survey. *Tobacco Control*, 12, 1-9.

<sup>170</sup> National Sample Survey Office (2015), *op.cit.*, p. 10.

hospitalized cases for the ailments reported. The same goes for DLHS-4 (2014)<sup>171</sup> data which also reports the acute illness occurring for a week and chronic illness which prevailed for more than a month. However, DLHS-4 data presents diagnosed and undiagnosed cases which are almost the same with hospitalized and non-hospitalized cases of National sample survey. Studies dealing with self-reported and observed morbidity are presented below which may be of different types (acute and chronic):

Sundar and Sharma (2002) conducted a study in the slums of two cities of India (Delhi and Chennai) based upon the NCAER<sup>172</sup> survey (2000).<sup>173</sup> The study was based on stratified sampling of 1000 households from each cities and gathered information regarding the prevalence of any acute and chronic ailments along with hospitalizations. The time taken for reference of acute illness was one month at the time of survey and hospitalizations in the last one year. The study found that the monthly prevalence of morbidity (acute plus chronic) was 104 episodes per 1000 population in Delhi while it was just 83 episodes per 1000 in Chennai which may be the better environment of Chennai as most of the slums are located in resettlement colonies. The same study also found that the prevalence of diseases decreased with the increased in income. In terms of diseases pattern, both the cities had high prevalence of infectious diseases accounting for 51.7 per cent in Delhi and 58.5 per cent in Chennai.

As a study conducted by Sen (1998)<sup>174</sup> demonstrated that self reported morbidity can be largely dependent upon the educational background and level of awareness as most often they are not aware about the illness itself. This he demonstrated by taking the classic case of Kerala and Bihar. Kerala known for highest life expectancy, highest literacy and awareness has the highest reported morbidity which runs completely against their life expectancy. While Bihar known for low life expectancy and woeful state of medical facilities has the lowest self reported morbidity. This shows the limitations of 'sensory

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<sup>171</sup> Ministry of Health and Family Welfare (2014), *op.cit.*, p. 28.

<sup>172</sup> NCAER is known as National Council of Applied Economic Research. It is India's oldest, non-profit, economic policy research institute.

<sup>173</sup> Sundar, R. and Sharma, A. (2002). Morbidity and utilization of healthcare services: A survey of urban poor in Delhi and Chennai. *Economic and Political Weekly*, 37(47), p. 4733.

<sup>174</sup> Sen, A. (1998). Mortality as an indicator of economic success and failure. *The Economic Journal*, 108(446), p.19.

perception of health which may have been influenced by the social environment one lives in.<sup>175</sup> Thus, he concluded that although one's internal perception deserves attention but relying on it as the sole indicator for health status can be misleading.

Self reported health is influenced not just by the level of education and awareness but also the age of the population. Certain age groups may have greater self – reporting of ill health due to their ageing body. Here, a case can be cited about the self reported health of the elderly group of population in Northern India. The study conducted by Joshi et al. (2003)<sup>176</sup> covering about 200 elderly population aged 60 years and above with 100 each from the city of Chandigarh and rural population of Haryana. While a physician was engaged in diagnosis of any reported illness along with psychological examination. Out of the 88.9 per cent of the sample population reported to be ill based on their perception, only 43.5 per cent were actually taking treatment while 42.5 per cent were diagnosed with several diseases at a time. “Anaemia, dental problems, hypertension, chronic obstructive airway disease (COAD), cataract, and osteoarthritis were the most prevalent morbidity.”

### **(iii) Studies related to other types of morbidity**

Other types of morbidity include maternal morbidity, reproductive morbidity and morbidity related to nutrition which has been grouped separately for the convenience of the study. They are explained as follows:

According to Bang et al., (2004)<sup>177</sup> maternal morbidity is found to be associated with pregnancy both during perinatal and post natal period. The morbidities occur during labour, during puerperium period etc. It was found that during labour maternal morbidities like prolonged rupture of membranes, prolonged labour, abnormal presentations, retained placenta, primary postpartum hemorrhage etc occurred.

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<sup>175</sup> *Ibid.*

<sup>176</sup> Joshi, K., Kumar, R. & Avasthi, A. (2003). Morbidity profile and its relationship with disability and psychological distress among elderly people in Northern India. *International Epidemiological Association*, 32, p. 978.

<sup>177</sup> Bang, R.A., Bang, A.T., Reddy, M.H., Deshmukh, M.D., ....Fillipi, V. (2004). Maternal morbidity during labour and the puerperium in rural homes and the need for medical attention: A prospective observational study in Gadchiroli, India. *BJOG: An International Journal of Obstetrics and Gynecology*, 111, 231–238.



During puerperium stage, secondary post partum hemorrhage, puerperal fever, infection, psychosis, severe anxiety or depression etc was found. Also nearly 15 per cent women who deliver in rural homes potentially need emergency obstetric care for safe motherhood. Information on maternal morbidity could go a long way into planning for safe motherhood outreach activities in developing countries and 42.9 per cent women had problems during the postpartum period.<sup>178</sup>

A study conducted by Madhiwalla & Amar (1997)<sup>179</sup> showed the gender bias in morbidity prevalence with males reporting prevalence rate of 169 per thousand and females 297 per thousand which increased to 571 per thousand after probing repeatedly. Also the study found difference in morbidity especially concentrated in the reproductive age for cohabiting women (850 per thousand) as against female without child (818 per thousand). Analysis of male age wise morbidity showed that the highest morbidity was reported highest at young age. As for female the highest morbidity was reported in the age groups under five to forty five after which it declined. This clearly shows the lack of antenatal care, postnatal etc amongst females and the need for programmes to focus on providing healthcare to women especially in reproductive age groups.<sup>180</sup>

A study conducted by Khongsdier (2002)<sup>181</sup> to find the relationship between BMI and prevalence of morbidity amongst the adult males in Northeast India found that there the relationship was not significant although even if there mass prevalence of chronic energy deficiency (35 per cent) and higher illness amongst those males below 17.0kg/m<sup>2</sup> BMI. It concluded that other factors such as income and income of the households.

### **2.5.3 Mortality as an outcome measure**

Mortality studies as an outcome of healthcare is very important as it can be measured reliably and easily without any manipulation and misinterpretation of the data. Reducing mortality as an outcome indicator of quality healthcare is one of the goals of government, demographers,

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<sup>178</sup> Bang, R.A., Bang, A.T., Reddy, M.H., Deshmukh, M.D., ....Fillipi,V. (2004), op. cit., pp. 231-238.

<sup>179</sup> Madhiwalla, N. & Amar, J. I. (1997). Morbidity among women in Mumbai city impact of work and environment. *Economic and Political Weekly*, 38-49.

<sup>180</sup> *Ibid.*

<sup>181</sup> Khongsdier, R. (2002). Body mass index and morbidity in adult males of the war Khasi in Northeast India. *European, Journal of Clinical Nutrition*, 56, 484-489.

and planners at world, country and local level. However, caution must be exercised in measuring mortality as an outcome of quality healthcare as it can be affected by several factors apart from the quality of healthcare.<sup>182</sup>

Mortality rate is an important component for population projections and calculation of life tables. In India Sample Registration System provides data on deaths and various measures of mortality such as “Crude Death Rate (CDR), Under-five Mortality Rate (U5MR), Infant Mortality Rate (IMR) and its components, Age Specific Mortality Rates (ASMR), Still Birth Rate (SBR) and Peri-Natal Mortality Rate (PMR)”<sup>183</sup>. Mortality decline is associated with demographic transition and epidemiological transitions<sup>184</sup> in the world. The life expectancy for the whole world increased from 48 years in 1950-55 to 68 years in 2015-2010<sup>185</sup> which was still 67.9 years for India in 2010-14 per SRS (2014)<sup>186</sup>. Increased in life expectancy means decreased in mortality. For example in Africa , 37 per cent of the deaths were concentrated among children under five and adults aged over 60 and over accounting for 22 per cent of the deaths in 2005-2010. While in Europe (except for eastern Europe) deaths among children were less than 1 per cent and 85 per cent among adults over 60.<sup>187</sup>

#### **2.5.4 Studies related to mortality**

Since very few studies have attempted to study the death cases of the population as a whole instead of the age specific deaths rates, the following studies has been classified following the two major themes that was found in the literatures i.e., maternal and infant mortality. While cases not coming under this category has been grouped under the ‘other’ category.

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<sup>182</sup> Schneider (2002), *op. cit.*, pp. 1-3.

<sup>183</sup> Estimates of mortality indicator. Retrieved from [http://www.censusindia.gov.in/vital\\_statistics/SRS\\_Report/11Chap\\_per\\_cent204\\_per\\_cent20\\_per\\_cent202011.pdf](http://www.censusindia.gov.in/vital_statistics/SRS_Report/11Chap_per_cent204_per_cent20_per_cent202011.pdf)

<sup>184</sup> Omran (1971), *op. cit.*, p. 516.

<sup>185</sup> Earth Policy Institute from United Nations Population Division (2010). World population Prospects: the 2010 revision. Accessed on 8/07/2017. Retrieved from [http://www.earthpolicy.org/datacenter/xls/indicator1\\_2011\\_8.xls](http://www.earthpolicy.org/datacenter/xls/indicator1_2011_8.xls)

<sup>186</sup> [http://www.censusindia.gov.in/Vital\\_Statistics/SRS\\_Life\\_Table/2.Analysis\\_2010-14.pdf](http://www.censusindia.gov.in/Vital_Statistics/SRS_Life_Table/2.Analysis_2010-14.pdf)

<sup>187</sup> United Nations, Department of Economic and Social Affairs, Population Division (2012). *Changing Levels and Trends in Mortality: the role of patterns of death by cause* (United Nations publication, ST/ESA/SER.A/318).

### (i) Infant mortality

Visaria (1985)<sup>188</sup> made an attempt to portray the differentials in IMR in India from pre-independence time onwards to post independence time. It showed the decline in IMR by about 134 during 1941-50 despite the limitations of data. In 1981, the IMR decline to about 110 which was quite high as compared to China (32) and Sri Lanka (67) in 1982. While state wise comparison of 1970-72 and 1973-75 data shows the “increase in IMR of about 10 per cent or more in Haryana, Orissa and Rajasthan, around five per cent for Assam and Uttar Pradesh.”<sup>189</sup> The state wise account for 1976-78 and 1979-80 shows the decline in IMR of all states except for Jammu Kashmir (which had the second lowest IMR) and Madhya Pradesh and Orissa (being the tribal belt) has the second and third highest IMR respectively.

Arnold et al. (1998)<sup>190</sup> studied the effect of son preference on parity progression and ultimately on child mortality in India using National Family Health Survey data and found that the “son preference fundamentally affects demographic behaviour in India” The state of Punjab, Rajasthan, Uttar Pradesh and Haryana exhibited excess mortality which was more severe in case of families with more children. Infact, the three states with highest fertility has 88 per cent excess mortality for girl child. While the states of Goa, Kerala and Tamil Nadu have higher mortality for boys than girl child.

A community based retrospective study was conducted by Khanna et al. (2003)<sup>191</sup> to determine the causes behind the sex ratio imbalance with less favourable treatment of girl child during infancy. The study found that the infant mortality was 1.3 times higher for females (72 per 1000) than in males (55 per 1000) with diarrhoea being the main cause of the death. It highlighted the fact that three out of every four cases of death with no preceding illness were that of girls. It concluded that the excess death of females may be due to non-treatment girl child in treatable conditions like diarrhoea.

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<sup>188</sup> Visaria, L. (1985). Infant mortality in India: Levels, trends and determinants. *Economic and Political Weekly, Special article*, 1353-1356.

<sup>189</sup> *Ibid.*, p. 1356.

<sup>190</sup> Arnold, F., Choe, K. M & Roy, T. K. (1998). Son preference, the family-building process and child mortality in India. *Population Studies*, 52(3), 301-311.

<sup>191</sup> Khanna, R., Kumar, A., Vaghela, J. F., Sreenivas, V. & Puliyel, J. M. (2003). Community based retrospective study of sex in infant mortality in India. *British Medical Journal*, 327(7404), 126-127.

Klaauw & Wang (2011)<sup>192</sup> conducted a study on infant and child mortality in the rural areas of India using Indian National Family Health Survey (INFHS, 1998-99) data highlighted the role of certain socio-economic factors such as parental education, household standard of living such as toilet facility, having doctor in a village etc have an effect upon reducing mortality. It was found that 27.8 under-age-five deaths per 1000 live birth would be saved from untimely death if the mother had completed primary education. Other factors like having toilet facility also have a significant chance of reducing mortality after the first birthday. It was also found that in case of all the villages in rural areas having a doctor, slightly over eight under-age-five-deaths per 1000 births would be averted.

Laishram & Chungkham (2006)<sup>193</sup> conducted a study to find out the role of socio-cultural and environmental factors in elucidating the child mortality in Northeast India using INFHS (1992-93 and 1998-99) data. It found that the children born to working women are 18 per cent more likely to die than the non-working women as they usually have to labour in agricultural fields that too in rough terrain and climatic extremes (of very cold and wet). While children born to the age group of mothers of 18- 24 and 24 and above years has less than 40 per cent and 24 per cent chance of dying than those born to mothers of less than 18 years of age. Also, children born to families with high Standard of Living Index (SLI) was 20 per cent unlikely to die than those born in low SLI households.

## **(ii) Maternal Mortality**

Maternal deaths are the deaths occurring at four stages of pregnancy such as, “(i) woman was pregnant when she died, (ii) died within six weeks of abortion or at the time of abortion, (iii) died during childbirth, and (iv) died within six weeks of childbirth or at the end of pregnancy.”<sup>194</sup>

Studies have shown morbidity to be linked with premature mortality across gender, age groups etc. Across gender women are prone to immature death which is linked to their

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<sup>192</sup>Klaauw, B. V. D. & Wang, L. (2011). Child mortality in rural India. *Journal of Population Economics*, 24(2), 617-619.

<sup>193</sup>Laishram, L. & Chungkham, H. S. (2006). Place, community education, gender and child mortality in North-East India. *Population, Space and Place*, 12, 70-73.

<sup>194</sup>Radkar, A & Parasuraman, S. (2007). Maternal Deaths in India: An exploration. *Economic and Political Weekly*, p. 3261.

reproductive health. In fact, Bhore Committee (1946)<sup>195</sup> estimated maternal death of four million annually arising out of morbidity linked to child birth. It reported that deaths less than one year were 24.3 per cent and under five mortality 18.6 per cent. These rates give an idea of the prevalent health conditions of mother and child during 1935-39.

Maternal mortality is just the tip of the iceberg of the maternal health issues caused due to complications following pregnancy and child birth which can be prevented if timely medical care were given. Around 73 per cent of all maternal deaths in 2003- 2009 were due to direct obstetric causes while indirect causes accounted for 27.5 per cent of the deaths.<sup>196</sup> In the more developed world today maternal mortality is grossly under reported as most of the deaths are non-obstetric. While in India mis- classification of cause of mortality is further compounded by sparse and unreliable civil registration data and few community level studies. As the civil registration data does not specify the cause of death for maternal mortality and is not in compliance with the International Classification of Diseases for cause of death reporting, coding and classification; high incidence of unclassifiable deaths as well as lack of district level data.<sup>197</sup> However a study conducted has found that maternal mortality in India is mainly caused by hemorrhage mostly postpartum hemorrhage accounting for 38 per cent of the maternal deaths (SRS, as cited by Vora, 2009)<sup>198</sup>. While anaemia was highly prevalent among the Indian population with nearly 60 per cent of pregnant women were anaemic (NFHS as cited by Vora, 2009).<sup>199</sup>

Health of the mother depends upon the level of nutrition, antenatal and post natal care given to mother. However, it is not just the diet but also the discrimination meted out to females within the family in terms of resources for access to healthcare and adequate diet to sustain their health especially to pregnant and lactating mothers. A study by Jayaraj (2008)<sup>200</sup>

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<sup>195</sup> Bhore Committee (1946), *op. cit.*, p. 9.

<sup>196</sup> Say, L., Gemmill, A., Tuncalp, O., Maller, A. B. & Alkema, L. (2014). Global causes of maternal death: A WHO systematic analysis. *Lancet Global Health*, p. 327.

<sup>197</sup> Pandey, A. & Mishra, R. M. (2010). Health information system in India: Issue of data availability and quality 1, *Demography India*, 39(1), pp. 116-117.

<sup>198</sup> Vora, K.S., Mavalankar, D.V., Ramani, K.V., Upadhyaya, M., Sharma, B., .....Iyengar, K. (2009). Maternal health situation in India: A case study. *International Centre for Diarrhoea Disease Research Bangladesh*, 27(2), p. 186.

<sup>199</sup> *Ibid.*

<sup>200</sup> Jayaraj, D. (2008). Factors contributing to the declining trend in sex-differentials in mortality in India. *Economic and Political Weekly, Special Article*, 60-70.

conducted have found that the decline in excess female mortality in the reproductive age group is “due to the process of demographic development and not due to decline in discrimination in the intra-family allocation of resources”. Radkar&Parasuraman (2007) conducted a study into the maternal deaths in India using Reproductive and Child health survey-2 (2002-04) which collected data for the entire country. It studied the maternal deaths by background characteristics showed that most of the maternal deaths occurred in rural areas and women with low living standard. This has been illustrated by the fact that “84 per cent of those who fetched water from outside the house and 72 per cent” of those who had no toilets have died during pregnancy. While in terms of age, 32 per cent died in the 20-24 years age groups which also happen to be the age group having one of the highest fertility. Another important finding of the study was that most of the women with no children or either having higher order births died during the third trimester (62 per cent). This shows that despite “carrying a pregnancy till almost full term they could not sail through safely”.<sup>201</sup>

Ghosh (2014)<sup>202</sup> conducted a study into the variations of maternal deaths in India across the ‘demographic, socio-economic and other community or village level characteristics’ using DLHS-3 (2007-08) data. The study found that maternal deaths were concentrated between 20- 24 years of age (26.2 per cent). Amongst the social groups, other backward caste registered the highest percentage (38.2 per cent) while scheduled caste has the lowest among them (21.4 per cent). Also, the economically poor sections of the society registered the highest number of maternal deaths (43.7 per cent) with those living in kaccha house accounting for highest number of maternal deaths (53.4 per cent). In terms of community level characteristics, villages which were more developed had lesser percentage of maternal deaths (45 per cent) than those which were better developed (22.4 per cent).

Sakia (2014)<sup>203</sup> studied the health status of the northeastern states using four health indicators such as crude birth rate, crude death rate, and IMR and child immunization. It highlighted that the status of all the northeastern states was far better than the national average except for Assam and Meghalaya in terms of CBR, CDR and IMR in rural and urban areas. The two

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<sup>201</sup>Radkar&Parasuraman (2007), *op.cit.*, p. 3260.

<sup>202</sup>Ghosh, S. (2014). Maternal deaths in India: The role of national rural health mission. *Indian Journal of Human Development*, 29-34.

<sup>203</sup> Sakia & Das (2014), *op. cit.*, pp. 77-100.

states have low performance in all the three indicators in rural areas as compared to the urban areas.

Zaman & Begum (2014)<sup>204</sup> conducted a survey of the maternal deaths in the Barpeta (district) during January, 2012 to December, 2013 studying about 73 cases of maternal deaths out of 10,291 live births giving an MMR of 709.35. It was found that 55.55 per cent of the deaths occurred in the third trimester and 25.92 per cent in the first trimester. The major causes of the death were eclampsia (28.76 per cent), anemia (23.24 per cent), septicemia (9.58 per cent) etc. It also highlighted the fact that most of the women who died (46.58 per cent) have no ANC care pointing to the fact that most of the deaths could have been avoided with antenatal care at the time of pregnancy.

## **2.6 Literature Gaps**

The gaps in literature have been organized based upon the themes of the study into availability of healthcare, accessibility of healthcare and affordability of healthcare facilities. They are written as follows:

### **2.6.1 Literature gaps in studies relating to availability of healthcare facilities**

Analysis of the literatures on availability of healthcare facilities have largely dealt with availability of healthcare facilities at state level, in rural areas, across class, caste and sectors for example, Lakshmana (2010)<sup>205</sup>. However, the question of availability of healthcare facilities from a regional perspective is missing. In a region like Northeastern part of India where the most dominant factor in development is the physiography, the availability of healthcare services is most likely to be affected by the dominant relief features of the region. The two most dominant physiography of the region being the hills and the valleys, it is imperative for the study to imbibe the role of the geographic characteristic of the region. The

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<sup>204</sup>Zaman, S. & Begum, A. A. (2014). Maternal mortality at a rural medical college of Assam: a retrospective study. *Journal Obstetric Gynecology Barpeta*.1(1), p. 47.

<sup>205</sup>Lakshmana (2010), *op. cit.*, p. 423.

availability of health care facilities done by Sakia (2014)<sup>206</sup> was conducted at state level and hence, the geographic role of study is missing from the study. Also, the availability of healthcare facilities at district level is largely missing from all the study conducted so far. Hence, the need to study the availability at district level to get the district level distribution of healthcare facilities. Since, there is huge shortage of literature when it comes to health care in Northeast India. So far, only a minor study has been conducted into the availability of healthcare facilities in Northeast. The study tries to address this shortage of information by attempting to study availability from a regional perspective and at district level.

### **2.6.2 Literature gaps in studies relating to accessibility of healthcare facilities**

Accessibility as spatial factor has been studied in U.S.A and Canada while there are very few studies dealing with spatial factor in accessibility. The studies conducted by Guagliardo (2004)<sup>207</sup>, Mao et al., (2013)<sup>208</sup>, Hare & Marcus, (2007)<sup>209</sup> have addressed the question of spatial and non-spatial concept of accessibility. The question of accessibility has been addressed from provider to population ratio, the role of distance in accessibility etc. In India the question of accessibility of healthcare had been addressed from the perspective of non-spatial factor. For example study by Iyer et al., (2007)<sup>210</sup> and Kundu (2010)<sup>211</sup> etc have dealt with gender and caste which may be because of the fact that India is a diverse country with different cultural practices and different social groups. However, when it comes to region like the Northeast which is still vastly rural and under developed, the role of geographic factor or spatial factor in hindering accessibility needs to be studied. Also, there is lack of study on accessibility at district level. The present study will try to bridge gaps by addressing the accessibility of healthcare facilities at regional level and at district level. Accessibility of the healthcare facilities as well as accessibility of the personnel providing healthcare is very important.

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<sup>206</sup> Sakia & Das (2014), *op. cit.*, p. 77.

<sup>207</sup> Guagliardo (2004), *op. cit.*, p. 1.

<sup>208</sup> Mao & Nekorchuk (2013), *op.cit.*, pp. 115-122.

<sup>209</sup> Hare & Barcus (2007), *op.cit.*, pp. 181-205.

<sup>210</sup> Iyer, Sen & George (2007), *op. cit.*, pp.537-540.

<sup>211</sup> Kundu (2010), *op.cit.*, pp. 105-133



### 2.6.3 Literature gaps in studies relating to affordability of healthcare services

Most of the studies in U.S.A have largely dealt with affordability of health insurance which is missing in India. However, limited coverage of health insurance in India, the present studies addresses the issue of affordability from the perspective of ability to pay and willingness to pay.

Moreover, the question of affordability of healthcare has largely been ignored in the literatures dealing with healthcare services in North east India. Also, most of the literatures in India deal with Out of pocket expenditure and catastrophic expenditure only and not out of pocket expenditure as a reason for lack of affordability. Ghosh (2011)<sup>212</sup> and Flores et al., (2008)<sup>213</sup> have mostly dealt with catastrophic expenditure incurred on healthcare services. The larger question of affordability of healthcare has mostly been ignored except for a study by Dey et al., (2012)<sup>214</sup> which dealt with affordability of health care from the perspective of OOP expenditure. The question of affordability will be addressed in the study from regional perspective and at district level as these perspectives are missing from literature studied. Although the study of catastrophic expenditure is important, due to the limitation of the data as consumption expenditure of household on other items is not available, the present study interprets affordability from ability to pay perspective.

The lack of literature at district level may be due to lack of district level data in the Northeast. Moreover most of the healthcare studies had been done using NSSO (60<sup>th</sup>)<sup>215</sup> and (71<sup>st</sup>)<sup>216</sup> round data which does not provide district level data. The study will address this lack of data at district level using the District level Household Survey-4 (2012-13) in the Northeastern states.

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<sup>212</sup> Ghosh (2011), *op. cit.*, p. 68.

<sup>213</sup> Flores, G., Krishnakumar, J., O'Donnell, O&Doorslaer, E. V. (2008). Coping with health care cost: Implications for the measurement of catastrophic expenditures and poverty. *Health Economics*, 17, p. 1404.

<sup>214</sup> Dey et al. (2012), *op.cit.*, pp. 373-374.

<sup>215</sup> National Sample Survey Office (2006). Morbidity, healthcare and conditions of the aged. New Delhi: Ministry of Statistics and Programme Implementation, Government of India.

<sup>216</sup> National Sample Survey Office (2015), *op.cit.*, p. 10.

#### **2.6.4 Literature gaps in studies relating to outcome of healthcare services**

Furthermore, the existing literature in terms of morbidity in Northeast India points mostly burden of illness, occurrence of acute diseases etc (Nangbam & Ladusingh, 2015). However, the question of morbidity occurrence as a result of lack of health care services has not been studied. The study will try to address this issue with morbidity and proportion of deaths as an outcome of healthcare facilities in terms of availability, accessibility and affordability.

Also, one needs to study the role of other socio-economic determinants like the social groups in existence in Northeast, the role played by the primary, secondary education in ensuring good health outcomes as these may influence the health conditions of the people in residing Northeastern region of India.

### **2.7 Conclusion**

Healthcare care system evolved from the earliest practice of medicine such as the Ayurveda, Surgery, Acupuncture, Galenic to the modern healthcare system of today. Today's health care system comprises of the private healthcare facilities and the public healthcare facilities. The studies dealing with availability have shown that there is shortage of physical healthcare facilities as well as the human resources needed to provide healthcare facilities. Studies dealing with availability of healthcare facilities is largely lacking in Northeastern states of India. The second part of the literature dealing with accessibility has shown that both spatial and non-spatial factors determine the accessibility to healthcare facilities. Most of the literature in U.S.A deals with the spatial component of accessibility while the literatures of India are mostly confined to the non-spatial component reflecting the social reality of India. However, in the northeastern states of India which is mostly known for its' rough topography the spatial component may hamper the accessibility to healthcare facilities in the region. While coming to affordability, the literatures have addressed both attempts to ensure affordability in the form of providing healthcare facilities by the government (like the National Health Service scheme of the U.K. and the three tier public healthcare system of India) as well as ensuring the mandatory purchase of healthcare insurance (like the Medicare, PACA etc in U.S.A.). However, literatures in India have largely dealt with affordability from

the Out of pocket expenditure and catastrophic expenditure although the concept of ability to pay and willingness to pay is equally important. Although, the affordability cannot be truly reflected by the public healthcare expenditure which is largely funded by government in India, the present study will try to put up geographical picture of affordability in relation with availability of healthcare facilities in the Northeastern states of India. While the last part of the literature dealing with outcome of the healthcare facilities have seen two types of literatures; those dealing with morbidity and those dealing with mortality. Morbidity is seen in the form of communicable and non-communicable and self reported and observed morbidity. But these cannot be separated into two different subtypes. The morbidity literature shows the prevalence of both communicable and non-communicable disease in India. While the mortality literature shows that mother and child are the most vulnerable group prone to untimely death due to the inter-play of socio-economic and lack of healthcare facilities.

## Chapter 3

### Healthcare Services in Northeast India

#### 3.1 Introduction to the concept of health services/facilities

Healthcare facilities comprises of two main components physical infrastructure and human resources. The physical healthcare services in rural areas can be classified into three basic levels such as Sub- Centre (SC), Primary Health Centre (PHC) and Community Health Centre (CHC). Health planners in India have envisioned the role of SC and PHC as the basic infrastructure to deliver healthcare services to rural areas since the initiation of the Bhore Committee 1946.<sup>1</sup>

##### 3.1.1 Sub-centre

A sub-centre should be manned by one ANM, MHW and one LHV. It is the most crucial unit of healthcare as it acts as the “first contact point”<sup>2</sup> between patient and health care system. It should have an average coverage of “3000 per SC in hilly/tribal/ desert areas”.<sup>3</sup> It should act as provider for medicines and maternal and child healthcare services.<sup>4</sup>

##### 3.1.2 Primary Health Centre

Primary Health Centre acts as a referral centre for six sub-centres fulfilling the role of “curative and preventive care” provider. As per IPHS (2007) “PHCs are the cornerstone of rural health services- the first port of call to a qualified doctor of the public sector in rural areas for the sick and those who directly report or referred from Sub-centres for curative, preventive and promotive health care. It acts as a referral unit for six sub-centres and

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<sup>1</sup>Directorate General of Health Services (2007). Indian Public Health Standards (IPHS) For Primary Health Centres. New Delhi: Directorate General of Health Services.

<sup>2</sup>Bhandari, L. & Dutta, S. (2007). Health Infrastructure in Rural India(p. 255). *India Infrastructure Report 2007*.

<sup>3</sup>Directorate General of Health Services (2007). Indian Public Health Standards (IPHS) For Sub- Centres (p. 10). New Delhi: Directorate General of Health Services.

<sup>4</sup>*Ibid.*,p. 6.

refers out cases to Community Health Centres (CHCs-30 bedded hospital) and higher order public hospitals at sub-district and district hospitals. It has 4-6 indoor beds for patients.”<sup>5</sup>

Typically a PHC should serve at least 20,000 population in hilly/tribal areas and 30,000 in plain areas. They came under major criticisms due to poor equipment, lack of staff and basic amenities.<sup>6</sup>

### **3.1.3 Community Health Centre**

CHC was set up with the ideal of providing referral and specialist services. Its population norm as laid down by IPHS (2007) is 80,000 for hilly areas and 1,20,000 for plain areas.<sup>7</sup> It should have 30 indoor beds with Operation Theatre (OT), X-ray, labour room and laboratory facilities, etc. It should also have two specialists like Anesthetists and Public Health specialist in addition to four other specialists such as Surgery, Medicine, Obstetrics and Gynaecologists and Pediatricians.<sup>8</sup>

### **3.1.4 District Hospital**

As per IPHS (2007)<sup>9</sup> District hospital means hospital at the ‘secondary referral level’ which will provide ‘super specialists’ healthcare services to a district of a certain ratio of population per geographical entity. It is the soul of the health care system providing both curative and preventive services at a secondary level. It also provides referral to specialist services if needed to both patients from urban and rural areas. However, it is not necessarily confined to the district’s population only, it also serves outpatient.

The availability of healthcare facilities is analyzed following the above norm mentioned for sub-centre, primary health centre and community health centre for the availability of SC, PHC and CHC. Variables like water supply at SC, regular power supply at PHC, residential

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<sup>5</sup>Directorate General of Health Services (2007). Indian Public Health Standards (IPHS) For Primary Health Centres (pp. 3-4). New Delhi: Directorate General of Health Services.

<sup>6</sup>*Ibid.*, p. 3.

<sup>7</sup>Directorate General of Health Services (2007). Indian Public Health Standards (IPHS) For Community Health Centres. New Delhi: Directorate General of Health Services.

<sup>8</sup>*Ibid.* pp. 5-8.

<sup>9</sup>Directorate General of Health Services (2007). Indian Public Health Standards (IPHS) For 201 TO 300 bedded district hospitals (p.3). New Delhi: Directorate General of Health Services.

quarter at PHC, functional OT at CHC etc. are taken as they are required for giving healthcare services to the people. The analysis has been separately done for the four tiers of health care system so as bring out the adequacy or inefficiency of each of the healthcare unit. Only when each unit is equipped with minimum facilities as per the IPHS norm (2007), healthcare services can be given at the optimum level. Without proper healthcare facilities, the outcome of healthcare cannot be expected to improve.

As Krousel-Wood (1999)<sup>10</sup> stated the health conditions of patients are determined by their 'encounter with healthcare system'. Studying outcomes will help in assessing the 'effectiveness of healthcare facilities' in Northeastern region of India which is known for its inaccessibility of terrain. The inaccessibility of the terrain makes it even more important to have public health care facilities for ensuring healthcare services to the people and also to ensure affordability of healthcare services. As community healthcare system and district hospital is meant to provide specialists services, proper facilities of specialists will reduce the need to go to private hospitals which will be of immense utility to the poor. However, Rajagopal (2010)<sup>11</sup> in a study brought up the desire of the poor to have access to private healthcare as they are known for their efficiency. With this in mind, it is important to study the quality of healthcare facilities in the Northeastern states of India. It is important to question the adequacy of healthcare facilities in existence in the remote corner of India where the resource is scarce for it to be wasted on non-functional public health care system.

The study classifies the composite index score of each variable into five classes with the help of mean and standard deviation method. The five classes are very high, high, medium, low and very low. Moreover, coefficient of variance is calculated so as to find out the inequalities in availability, accessibility and affordability of healthcare facilities over the hill and valley regions and districts of Northeast. The value of coefficient of variance is ranked into four categories viz. very high, high, medium and low solely for the purpose of comparison. The co-efficient of variance value of 0- 20 is categorized as low, 20-40 as medium, 40-60 as high and 60 and above as very high. The comparison for finding the level of inequality is done at

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<sup>10</sup> Krousel- Wood, M.A. (1999). Practical considerations in the measurement of outcomes in healthcare. *Ochsner Journal*, 1(4), 187-194.

<sup>11</sup> Rajagopal, N. (2010). Transformational process of health care choice of poor in Kerala, *Journal of Health Management*, 12(2), 123-135.

regional and district level along with the value of state level inequality. The inequality of each sub-region a state has not been calculated as states like Nagaland, Manipur has limited regions under valley regions while state like Assam has limited areas under hill regions. The state dominated by either hills or valley is taken up for comparison of inequality.

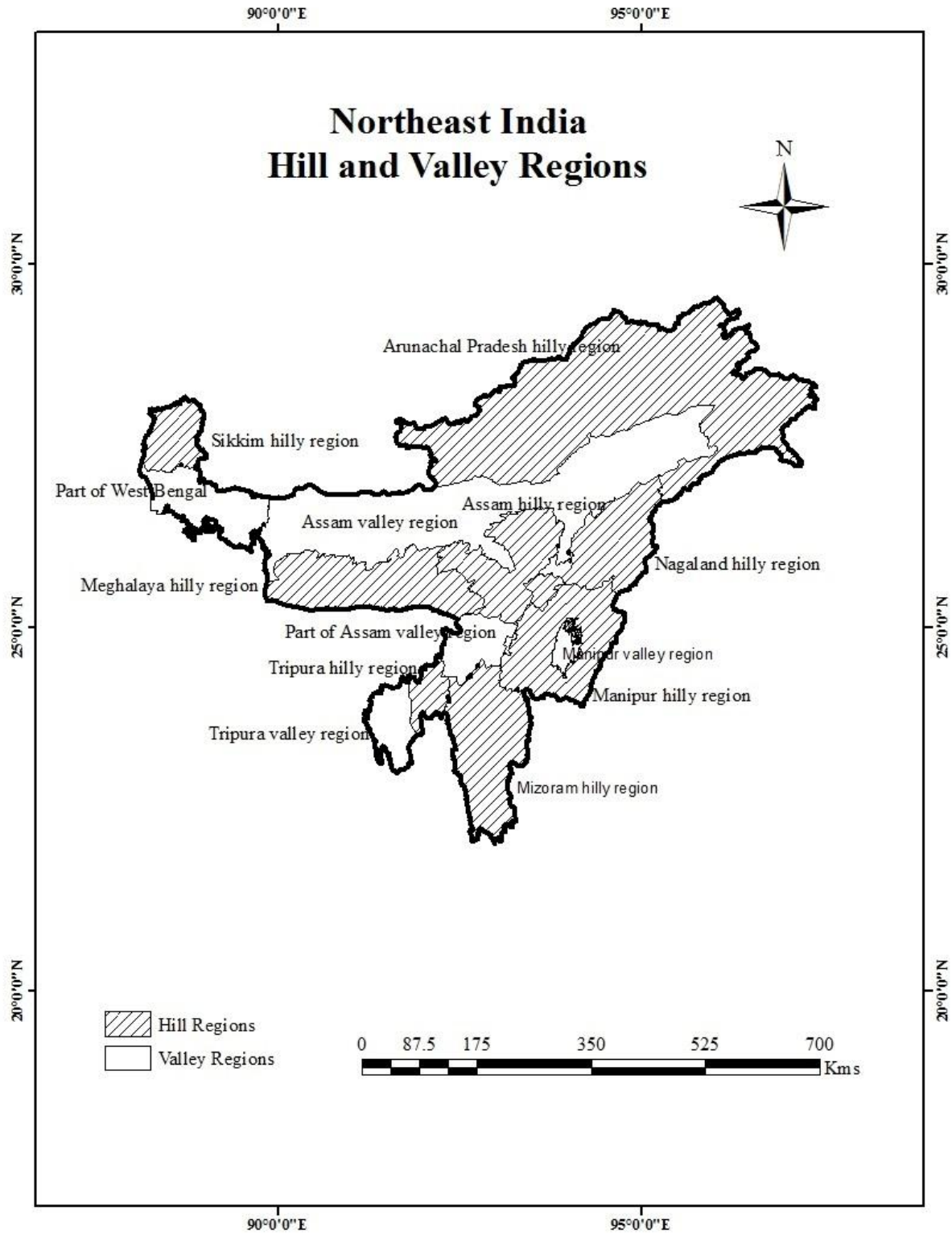
For analysis of level of availability, accessibility and affordability of healthcare facilities, the whole analysis is done at four levels: two major regions of the hill and valley where the whole northeast is grouped into two regions, the sub-regional level of the state .i.e., the hill and valley regions of the state if applicable and lastly the smallest region i.e., district level. This will give the geographical perspective of the healthcare facilities and its' outcomes.

### **3.2 Regionalization**

The Northeastern region as a whole has been divided into two major regions i.e., the hill/plateau and valley regions. The regionalization has been done by referring to the physiographic map of Northeastern states and then accordingly clubbing the hill regions and valley regions into two major hill/plateau and valley regions. Based upon the state physiographic map of Orient Blackswan atlas and standard book on Northeast like Taher & Ahmed (2012)<sup>12</sup>, each state has been further divided into hill and valley regions. The states like Sikkim, Arunachal Pradesh, Meghalaya and Mizoram are found to be predominately hill areas and hence are classified as hilly region. While the states of Assam, Manipur, Tripura and minor part of Nagaland are found to be plain areas as well as hill areas and hence classified into two regions i.e., hill and valley regions. Accordingly, 12 major hill/plateau and valley region has been made which has further been divided into 82 districts belonging to hill/plateau and valley regions of the state. The 12 hill and valley regions include: Arunachal Pradesh hilly region, Sikkim hilly region, Meghalaya hilly region, Mizoram hilly region, Manipur hilly region, Tripura hilly region, Assam hilly region, Nagaland hilly region, Assam

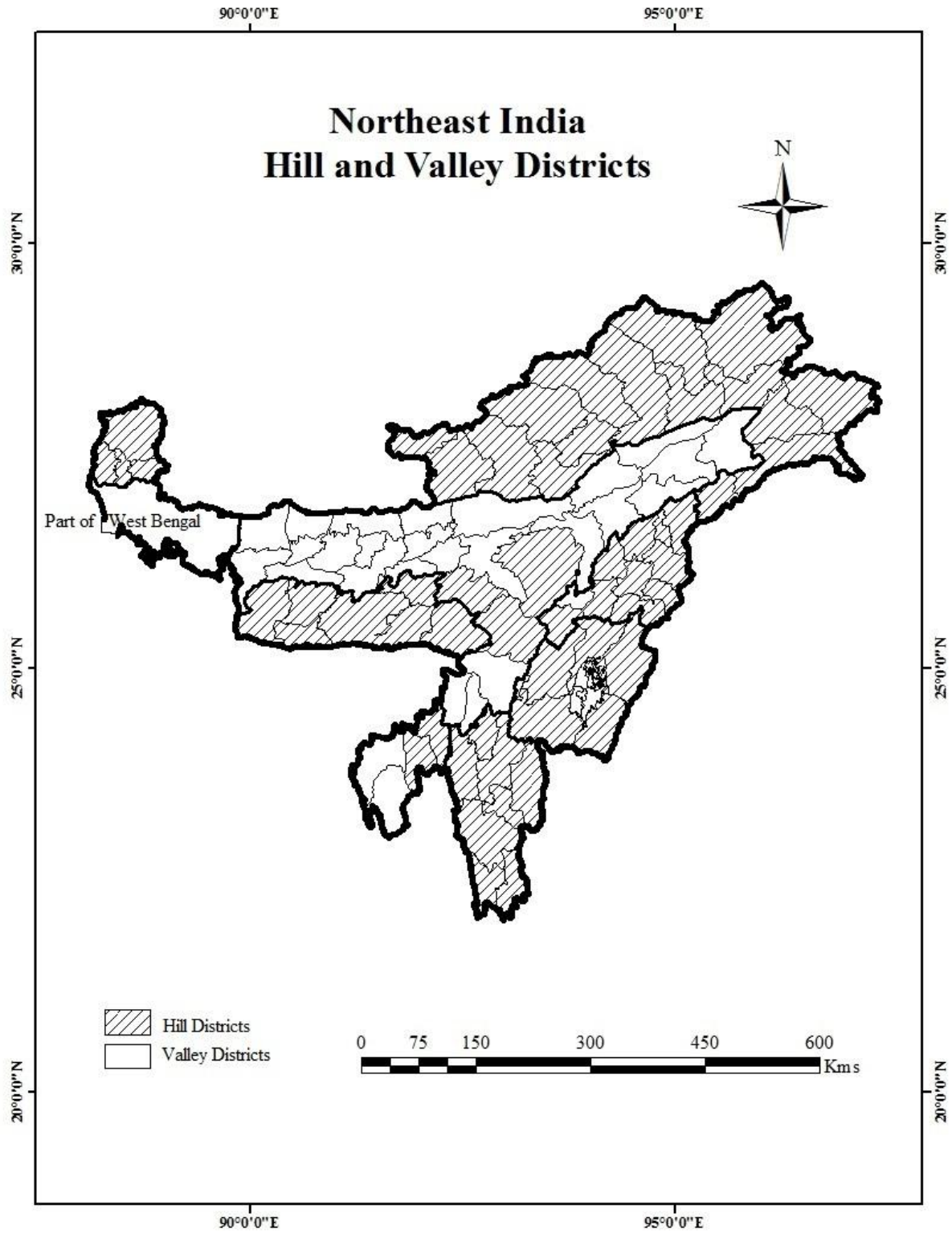
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<sup>12</sup> Taher, M. & Ahmed, P. (2012). *Geography of North-East India* (pp .28-29). Guwahati: Mani Manik Prakash.



Map 3.1: Hill and Valley regions of Northeast India.





Map 3.2: Hill and Valley Districts of Northeast India.

valley region, Manipur valley region, Tripura valley region and Nagaland valley region. Out of the 82 district of Northeast, 56 are hill districts and the rest belong to valley or plain districts which is validated by the fact that 72 per cent of the areas belong to hilly terrain in the Northeast.<sup>13</sup>

Analysis has been done at three levels: hill and valley regions of northeast, sub-regions of hills and valleys within each state and at district level. The hills and valley regions are mapped using Arc GIS and are given in the Map 3.1 and Map 3.2.

### **3.3 Patterns of availability of Physical healthcare services at Sub-Centres, Primary Healthcare Centres, Community Healthcare Centres and District Hospitals**

#### **3.3.1 Average person covered by Sub-Centre, Primary Health Centre, and Community Health Centre**

##### **(a) Regional level**

The Northeastern region has been divided into two major regions i.e., the hills and valley regions. These two regions have been divided into 12 sub-regions of hills and valley districts for the purpose of deeper analysis.

The sub-centres of the hilly region had more than 2815 person per SC populations which is below the norm given by the IPHS (2007)<sup>14</sup>. On the other hand, primary health centres (10,690 per PHC) and Community health centres (19,682 per CHC) had population coverage below the norm of 20,000 and 80,000 respectively. As for the valley region, the facility of sub-centre (5327 person per SC) is overburdened and is over 5,000 populations which are against the norm of SC. But PHC (22,773 per PHC) and CHC (84,050 per CHC) have population coverage below 30,000 and 1,20,000 respectively.

Coming to states, Arunachal Pradesh had the lowest average person covered under SC with 1,697 persons followed by Nagaland with 2,180 persons per SC. The highest coverage was

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<sup>13</sup>Taher & Ahmed (2012).*op. cit.*, p. 250.

<sup>14</sup>Directorate General of Health Services (2007). Indian Public Health Standards (IPHS) For Sub- Centres. New Delhi: Directorate General of Health Services.

found in Meghalaya with 6,838 persons per sub-centre. In terms of PHC, Meghalaya had the highest number of persons under PHC registering 28,203 persons per PHC which is way above the norm of 20,000 persons per PHC in the hilly region. As for the valley states, Tripura had the highest (29,121) followed by Manipur (23,584) and Assam (23,131) which are below the 30,000 norm for plain areas as laid down by IPHS (2007).

In terms of CHC, Assam recorded the highest number of population serving 1, 19,680 populations per CHC. This is just below the 1, 20,000 norm for a plain area reflecting that the CHC in existence is adequate for the people living there. While the rest of the valley state like Tripura and Manipur had fairly low coverage of population per CHC numbering around 47,613 and 37,617 respectively. The hill states like Mizoram and Nagaland had higher population coverage as compared to Manipur. This means that the community health centre is more in Manipur than the two hill states as mentioned above. While the hill states like Sikkim (9,500), Arunachal Pradesh (10,681) and Mizoram (12,223) had the lowest coverage. It is to be noted that Sikkim had only one Community health centre for the entire state even if its coverage is low.

For the purpose of regional approach, the above mentioned states have been further subdivided into sub-regions of hills and valley region. Then the analysis is carried out separately hills and valley regions separately as the norms of average person covered varies for hills and valley regions.

### **(i) Hilly Regions**

The average person covered per SC was lowest in Arunachal Pradesh hilly region which was just 1,627 persons per SC (Table No. 3.1). This may not just reflect the availability of the adequate sub- centre but may also be due to a poor population density of the region as the state itself has the lowest density of population in India with a density of 17 persons per sq. km (2011).<sup>15</sup> Furthermore, the district wise population density is even lower and uneven with

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<sup>15</sup>Census Info India (2011).Arunachal Pradesh Profile.

Retrieved from

[http://censusindia.gov.in/2011census/censusinfodashboard/stock/profiles/en/IND012\\_Arunachalpercent20Pradesh.pdf](http://censusindia.gov.in/2011census/censusinfodashboard/stock/profiles/en/IND012_Arunachalpercent20Pradesh.pdf)

Anjaw just have 3 persons per sq. km, Dibang Valley have only 1 persons per sq. km while the highest population density being Papum Pare with 51 persons per sq. km in 2011.<sup>16</sup>

Table No. 3.1 Average person covered per SC, PHC and CHC in the Hilly regions of Northeast.

<b>Hilly Regions of Northeast</b>	<b>Average person covered per SC</b>	<b>Average person covered per PHC</b>	<b>Average person covered per CHC</b>
<b>Norms for hilly region (IPHS,2007)</b>	3000	20000	80000
Arunachal Pradesh Hilly region	1627	4349	9937
Manipur Hilly region	3554	19928	14624
Meghalaya Hilly region	6743	26599	26428
Mizoram Hilly region	3389	7395	11462
Nagaland Hilly region	1897	6515	36656
Sikkim Hilly region	2128	10881	2375
Tripura Hilly region	5081	26402	43830
Assam hilly region	3895	14678	41564

Source: DLHS-4 (2012-13) State wise Report.

This is followed by Sikkim after Arunachal Pradesh in terms of population covered per SC (2,128). Sikkim has good health facilities for dealing with rural patients at first contact point. But, Sikkim also had low population density of 86 persons per sq. km with North district

<sup>16</sup>Northeastern Council Secretariat.(2015). *Basic Statistics of Northeastern Region 2015*. Government of India.

having the lowest population density of 10 persons per sq. km.<sup>17</sup> Hilly region of Nagaland also has good performance in the availability of Sub-centre with average persons covered per sub-centre being 1939.

The rest of the hill regions had above 3,000 persons per SC norm as laid down by IPHS (2007). Among them, Meghalaya had the highest number of persons covered under Sub-centre with 6,743 followed by hilly regions of Tripura (5,081) but lowest in the whole Northeast by Manipur (3,554) and Assam (3,895) respectively. Overall inequality in average population covered per SC was found to be high with a Co-efficient of Variance (CV) of 49 (refer to AnnexureTable No.1) in the hilly regions of Northeast India. This was reflected in the states wise CV like in the case of Arunachal Pradesh which had very high inequality with a CV of 76.94 despite the fact that the state had low population coverage. This shows that the low population coverage is not due to good availability of healthcare facilities but due to other factors such as political, social, geographical etc which need to be studied.

In terms of Primary Health Centre, the average person served was less than 20,000 norm of hilly areas with Arunachal Pradesh registering the lowest (4,349) populations served under PHC. The next region with the lowest average coverage per PHC was Nagaland (6515) followed by Mizoram (7,395). But regions like Meghalaya (26,599) and Tripura (26,402) had exceeded the norm of 20,000 persons per PHC. Although these regions had quite a good distribution of PHC's the density of population covered clearly suggest the need to have more sub-centers to cater to medical needs of the people living in hilly areas. Also, the hilly region of Manipur has slightly low coverage of populations per PHC with 19,928. The overall distribution of the PHC in the Northeast suggests the need to build more PHCs to serve the hilly regions. The inequality in terms of availability of PHC is very high as reflected by a CV of 61 (refer to AnnexureTable No.1). This is clearly seen from the fact that Arunachal Pradesh which is a hilly state has high inequality with a CV 48.67 while Meghalaya has low inequality with a CV of 18.18.

Regarding CHC, the average population served per CHC was less than the required norm of 80,000 in the hilly areas of the Northeastern region. Among these regions, the hilly region of

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<sup>17</sup>Northeastern Council Secretariat. (2015), *op. cit.*, p. 120.

Tripura served the largest number of persons with 43,830 per CHC followed by Assam (41,564), Nagaland (36,656), Manipur (14,624) and Mizoram (11,462) as second, third, fourth and fifth respectively. It is to be noted that Tripura and Assam has at least one CHC in each hilly district of the state. The same goes for Manipur, Nagaland and Mizoram which has one CHC each in the hill districts except for Chandel in Manipur, Longleng in Nagaland and Saiha in Mizoram. While regions like Sikkim and Arunachal Pradesh had very low coverage of population per CHC which were 2,375 and 9,937 respectively. It is also to be noted that these two regions have one of the rugged topography in the Northeastern regions of India. Therefore providing CHC in each region is very necessary for the better accessibility of healthcare. While Arunachal Pradesh has better distribution of CHC throughout the hilly regions of the state as compared to Sikkim which has only one CHC in South Sikkim.

However, the density of population in Arunachal Pradesh is just 17 persons per sq. km<sup>18</sup> questioning the population criteria laid down by IPHS (2007) for building SC, PHC and CHC. This points out to the fact that population norm cannot be fully applied in the regions of Northeast where hilly and mountainous terrain might hamper developmental works of roads leading to inaccessibility. As per the study conducted by NTDPC (2012) had shown that road construction work in Northeast were costly due to the hilly terrain which in turn makes the process of construction even more problematic due to inaccessibility of construction material. This shows the dominance of geographical factors over other factors hence, the IPHS (2007) for SC, PHC and CHC also needs to take into consideration other factors apart from the population norm.

Even if IPHS (2007)<sup>19</sup> laid down guidelines for establishment of CHC based upon population norm. The bigger issue is that population density is already low, so the principle of establishing healthcentres based upon population is not completely applicable in Northeast India. Rather, focus should be upon creating demand for healthcare facilities through health

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<sup>18</sup> Arunachal Pradesh Profile, Census Info India, 2011.

Retrieved from

[http://censusindia.gov.in/2011census/censusinfodashboard/stock/profiles/en/IND012\\_Arunachalpercent20Pradesh](http://censusindia.gov.in/2011census/censusinfodashboard/stock/profiles/en/IND012_Arunachalpercent20Pradesh)

<sup>19</sup> Directorate General of Health Services (2007). *op. cit.*, p. 5.

education as envisaged by Bhore committee (1946).<sup>20</sup> The committee recommended for imparting health education as it will inculcate a sense of hygiene and awareness. This awareness will lead to more demand in health. Other factors for creating demand can also be adopted like ensuring the accessibility of healthcare facilities, providing quality care to patients and ‘creating more supply’ which will automatically lead to more demand.

In terms of inequality, the average person covered by CHC is high with a Co-efficient of Variance (CV) of 68 in the hilly regions (refer to Annexure Table No.1). This high inequality can be seen in Nagaland which has a very high inequality of 95.36 while Meghalaya has low inequality with a CV of 12.83.

### **(ii) Plains / Valley regions**

The plain regions are found only in Assam, Manipur, Tripura and a minor part of Nagaland in Dimapur district despite the presence of undulating plains in some districts. Only Dimapur had dominant plain areas and hence it has been grouped into Valley region. However, it is to be noted that they are most densely populated areas of the Northeast. In this backdrop, the analysis of average coverage by SC, PHC and CHC can be done. Amongst the valley regions, Valley region of Tripura had the lowest coverage of 4159 per SC which is lesser than the norm of 5000 populations per SC in Valley region (Table No. 3.2).

Valley region of Nagaland register the highest population covered with population of 7,255 persons per SC. As the population density in the valley region is dense, there is a need to increase the facilities of sub-centre in the regions. The inequality in the availability of SC is low with a CV of 20 in the valley regions (refer to Annexure Table No.1). This is also reflected in the state wise CV of the valley states like Assam which also had low inequality in availability of SC with a CV of 20.05. The same pattern was seen in Tripura which is mainly dominated by plain areas (CV 16.45). This shows that the role of geographical factors upon availability of healthcare facilities in terms of SC facilities.

In terms of PHC, the average person covered is quite low in Nagaland which is just 8,032 reflecting the good availability of PHC in the region. On the other hand, Tripura Valley had

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<sup>20</sup> Bhore Committee (1946). *Health and Development Survey*(Volume II). New Delhi: Government of India, The Manager of Publications.

the highest number of populations with 34,251 persons per PHC that is above the norm of 30,000 per PHC in Valley region.

Table No. 3.2 Average person covered per SC, PHC and CHC in the Valley regions of Northeast.

<b>Valley Regions of Northeast</b>	<b>Average person covered per SC</b>	<b>Average person covered per PHC</b>	<b>Average person covered per CHC</b>
<b>Average Coverage in plain region</b>	<b>5000</b>	<b>30000</b>	<b>120000</b>
Manipur Valley	6529	28048	45572
Nagaland Valley	7255	8032	25289
Assam Valley	5628	25249	123444
Tripura Valley	4159	34251	47171

It was followed by Manipur and Assam which had 28,048 and 25,249 persons per PHC in the Valley regions. The inequality in average person covered by PHC was also high in the Valley regions with a CV of 47 (refer to Annexure Table No.1). The same pattern was reflected in Nagaland which had a very high inequality in terms of availability of PHC facility (CV 85.34) and Arunachal Pradesh (CV 48.67).

In terms of CHC, average coverage was very low in Nagaland accounting to 25,289 per CHC. The highest population covered per CHC is found in Assam with coverage above the 120,000 population norm in CHC. The rest of the regions like the Tripura and Manipur valley had an average coverage of 47,171 and 45,572 respectively which is also lower than the laid out norm. The inequality in terms of average person covered per CHC is very high with a CV of 72 in the valley regions (refer to Annexure Table No.1). However, it is not high in valley dominated state of Assam which had a CV of 33.42. While the states like Manipur (CV 57.14) had high inequality as the state is dominated by 90 per cent hilly regions and the remaining 10 per cent is made up of valley region.

A comparison of hills and valley showed that Nagaland had very low coverage of population per PHC and CHC both in hills and plains areas of the Northeast. However, the level of



inequality is high within the states in which Arunachal hilly region also had one of the best infrastructures in terms of SC and PHC among the hilly regions. While the average persons covered per CHC is lowest in Sikkim region which also did not have more than one CHC in the whole state.

#### **b. District level**

The district level analysis of average person covered has been done by categorizing the districts into five categories of very high, high, medium, low and very low based purposefully on mean and standard deviation method for better comparison.

##### **(i) Sub-centre**

As seen in Table No. 3.3, only one district i.e., Lawngtlai district (11,569 persons per SC) of Mizoram occupied the very high category in the whole Northeast which also happened to be a hilly region. This means that this particular district has very low availability of sub-centre as the average population coverage exceeds the 3000/ SC norm for hilly/ tribal region.

Fifteen districts came under the high category which includes East Khasi Hills (8444 persons per SC), South Garo Hills (7462 persons per SC), Jaintia hills (6318 persons per SC), etc. of Meghalaya, Thoubal (7062 persons per SC), Imphal West (7378 persons per SC) etc. of Manipur, Dhubri (7125 persons per SC), Nagaon (6945 persons per SC), Cachar (6352 persons per SC) etc. of Assam and Wokha district of Nagaland. In the districts of Meghalaya, there was high coverage per SC as districts like RhiBhoi and South Garo Hills which are hilly districts and hence should have population coverage of 3000 or below per SC.

In the districts of Manipur too, the availability of SC is not adequate for the population as the high category districts lay in the valley region of Manipur where there should be only 5000 population per SC. The same goes for districts of Assam which are mostly lying in plain region and densely populated districts of the region and hence the need for more sub-centre for meeting the need of the growing population settled there.

Table No. 3.3 District wise Category for average persons covered by SC, PHC and CHC.

Category	Sub- centre	PHC	CHC
Very High	1 ( 8638 and above) ( $\mu+2SD$ and above)	2 (39651 and above) ( $\mu+2SD$ and above)	5 (150469 and above) ( $\mu+3SD$ and above)
High	15 (6291 to 8638) ( $\mu+1SD$ to $\mu+ 2SD$ )	13 (27901 to 39651) ( $\mu+1SD$ to $\mu+ 2SD$ )	13 (99319 to 150469) ( $\mu+2SD$ to $\mu+ 3SD$ )
Medium	23 (3994 to 6291) ( $\mu$ to $\mu+1SD$ )	23 (16151 to 27901) ( $\mu$ to $\mu+1SD$ )	7 (48169 to 99319) ( $\mu+1SD$ to $\mu+2SD$ )
Low	27 (1597 to 3994) ( $\mu-1SD$ to $\mu$ )	29 (4401 to 16151) ( $\mu-1SD$ to $\mu$ )	57 (Below 48169) ( $\mu+1SD$ to $\mu$ )
Very Low	16 (Below 1597) ( Below $\mu-1SD$ )	15 (Below 4401) (Below $\mu-1SD$ )	NA

Source: Calculated from DLHS-4 (20112-13) State wise Report.

Twenty three districts were included under the medium categories which were the districts of Assam, Manipur and Tripura. Some of the districts of Assam like Kokrajhar (6290 persons per SC), Dhemaji (6188 persons per SC), Bongaigon (5975 persons per SC), Hailakandi (5716 persons per SC) etc served more than the norm of 5000 population per SC. The coverage of above 5000 per SC in these districts is due to high population concentration of Assam. At the same time, North Tripura with population coverage of 4589 persons per SC, Dhalai with 5573 persons per SC, Senapati with 4377 persons per SC and Bishnupur (4647 persons per SC) district of Manipur also included under this category. The reason being the plain area of the state attracting more population concentration except for North Tripura and Dhalai which happened to be a hilly area.

The districts which had low coverage of population per SC included Chandel (3906 persons per SC), Ukhrul (3252 persons per SC), Tamenglong (3089 persons per SC), Churachandpur (3148 persons per SC) districts. Even amongst these districts, Chandel had the highest (3906 persons per SC) and Tamenglong (3089 persons per SC) the lowest. This may be due to the balancing of low population and average health facilities. However, it was found that Ukhrul and Senapati districts had above 3000 norm of population per SC while Imphal East had less than 5000 population even though it is plain district.

South Tripura (3713 persons per SC) was also categorized under the low category which is quite good even after being a plain district indicating the availability of adequate SC. Saiha (1905 persons per SC), Serchhip (1990 persons per SC), Mamit (2088 persons per SC) etc. districts of Mizoram also fell under the low category with large number of sub-centres in each district accounting for the low coverage of population per sub-centre. West (2418 persons per SC) and East (2322 persons per SC) districts of Sikkim also included under this category which had also a good number of SCs in each district.

Papum Pare (2362 persons per SC), Longleng (2363 persons per SC), Tirap (2403 persons per SC) etc. of Arunachal Pradesh also belonged to low category with low concentration of SC because of the sparse population. Tuensang, Mon, Peren, etc. of Nagaland had very low population served per SC due to the availability of SC in all the districts in good numbers.

Upper Siang (829 persons per SC), East Kameng (780 persons per SC), Anjaw (719 persons per SC), etc. of Arunachal Pradesh occupies the very low coverage category. These districts had numbers of SC in the region ranging between 5 to 10 SC in each of the district which may be the reason behind low coverage coupled with low population distribution. Phek (1558 persons per SC) and Zunheboto (1265 persons per SC) districts of Nagaland also had very low category which may be due to the availability of high number of SC in each districts (15 in Phek and 19 in Zunheboto) along with low population concentration in the districts.

The level of inequality in the sub-centre at district level was found to be high with coefficient of variance score of 59.71 which was also seen at state level such as Mizoram (CV 98.28) had very high inequality while Tripura had low level of inequality with a CV of 16.45 (refer to AnnexureTable No.1). The same high level of inequality was seen at regional level too

with hilly region having a CV of 49 and valley region having a CV of 47 in the hilly regions showing that there is existence of high level of inequality at regional and district level.

## (ii) Primary Health Centre

According to Bhore committee (1946)<sup>21</sup> PHC was the primary unit of healthcare envisaged to provide preventive and curative cure. It was mandatory to provide a doctor to the primary unit at that time. But in present times the norms has been diluted to allow for the shortage in human resources by making PHC the referral centre of six sub-centres. Instead sub-centres should be provided with a doctor. The Bhore committee (1946)<sup>22</sup> recommended for a primary unit to be manned by six MO which is still not provided today as IPHS (2007)<sup>23</sup> recommended for only 3 MO at PHC which is half of what the Bhore committee recommended for the then population of British India. The availability of PHCs will ensure better care and prevention of diseases. In this regard, the district level analyses of PHC are done in each district of Northeast India.

It is found that there were only two districts in the very high category which were Cachar (50176 persons per PHC) of Assam and West Tripura (40,816 persons per PHC) due to the high population density along with not so high concentration of PHC in the districts. The remote southern location part of Cachar might have hindered the development of healthcare facilities in the region. Other districts of Assam like Dhubri (36635 persons per PHC), Dibrugarh (31,229 persons per PHC), Karimganj (29048 persons per PHC), Darrang-Udalgiri (31,988 persons per PHC) etc. grouped into the high category which is above the 30,000 population norm for plain areas. Although these districts have fair distribution of PHC, the facilities are not adequate to suffice the population need of the districts because of the large population density.

South Garo Hills (31,377 persons per PHC), South Khasi Hills (31,377 persons per PHC) and Jaintia Hills (28,867 persons per PHC) of Meghalaya also included under high category. This

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<sup>21</sup>Bhore Committee (1946). *Health and Development Survey* (volume I). New Delhi: Government of India, The Manager of Publications.

<sup>22</sup>*Ibid.*, p. 24.

<sup>23</sup> Directorate General of Health Services (2007), *op. cit.*, p. 20.

may be because of low availability of PHC as compared to other districts of Meghalaya owing to its hilly terrain.

Bishnupur (23,071 persons per PHC), Imphal East (24,960 persons per PHC), Senapati (25,523 persons per PHC) etc. districts of Manipur were grouped into the medium category. Senapati district is a part of the hilly region of Manipur but the population coverage is above the 20000/ PHC norm pointing to the inadequacy of the facility. While Bishnupur district had less than the 30,000 population per PHC for plain/ valley region and hence the PHC is adequate for the population of the region.

Nalbari (19,756 persons per PHC) and Goalpara (19199 persons per PHC) districts also grouped into the medium category. These districts had less than 30,000 populations below the norm for valley region. Karbi Anglong (17,699 persons per PHC) fell under the medium category which had less than 20,000 populations per PHC. Hence, the availability PHC facility is adequate in this district.

Lunglei (6,436 persons per PHC), Aizawl (7,484 persons per PHC), Champhai (6,610 persons per PHC) etc. districts of Mizoram were grouped under the low category with population coverage below 20,000 which point out to the adequacy of the facility in the region.

North (6,703 persons per PHC), East (8015 persons per PHC), South districts (12,435 persons per PHC) etc. of Sikkim were also grouped under the low category pointing to the adequacy of the PHC facility as the population needs. North Cachar Hills (11656 persons per PHC), Jorhat (11450 persons per PHC) and Kokrajhar (11268 persons per PHC) of Assam also fell under this category with population coverage less than 12,000 persons per PHC. Dibang Valley, Tawang, Lohit and Upper Subansiri of Arunachal Pradesh were classified under the low category suggesting the adequacy of the facility as per the population of the districts. Wokha (4824 persons per PHC) of Nagaland also fell under this category having good number of health facilities. Rest of the districts of Nagaland like Zunheboto, Kiphire, Longleng, etc. might also be grouped the very low category.

Upper Subansiri (3,440 persons per PHC), West Kameng (5,680 persons per PHC), East Kameng (3,269 persons per PHC) etc of Arunachal Pradesh can be grouped under the very low category. This may be because of the low population concentration of the districts.

The average coverage per PHC in Northeast India as a whole seems to be quite good since they are catering lesser population. But inter-district inequality in terms of availability of PHC is very high with a CV of 73 in the region which needs to be reduced with the increasing number of PHCs in the lagging districts (refer to Annexure Table No.1). The level of inequality is also high amongst the states with a CV of 85.34 in Nagaland, 48.67 CV in Arunachal Pradesh and CV of 42.16 in Assam. While inequality is low in case of Meghalaya which has a CV of 18.18 while Manipur has medium level of inequality with a CV of 34.41. This shows that there is high level of inequality in availability of PHC facility at regional and district level in the Northeastern region.

### **(iii) Community Health Centre**

IPHS (2007) had laid down the minimum population to be covered by a CHC facility as 1,20,000 populations for a CHC in plain areas and 80,000 for hilly/tribal region. This norm had been adopted for studying the availability of CHC facility in the Northeastern region. However, mere fulfillment of the norm does not mean the adequate availability of healthcare facilities. This is explained by the following analysis.

From Table No. 3.3, it was found that there were five districts in whole Northeast which were grouped under the Very High category of average person covered per CHC. This indicated that the CHC facilities in these districts were highly inadequate to meet the healthcare needs of the people. These districts included Cachar (1,89,292 persons per CHC), Sonitpur (1,64,826 persons per CHC), Karimganj (1,62,869 persons per CHC) which are over serving beyond the 1,20,000 norm. The over served areas points out the lack of CHC in the region and the need to build more to make healthcare more accessible to the people.

Meanwhile, 13 districts of Northeast were grouped under the high category of population coverage per CHC. The districts are Nagaon (1,44,483 persons per CHC), Goalpara (1,27,592 persons per CHC), Tinsukia (1,09,365 persons per CHC) etc. of Assam having not enough CHC to serve the population of the districts. In fact, the entire district belonging to

high category belongs to Assam. These district too had population coverage above the 1,20,000 norm for plain areas with the exception of Tinsukia.

Seven districts of Northeast such as Jorhat (93,366 persons per CHC), Bongaigon (63,334 persons per CHC) of Assam, West Tripura (58,719 persons per CHC) of Tripura, Bishnupur (64,731 persons per CHC) of Manipur came under the medium category. These districts have average coverage below the 1,20,000 per CHC norm for plain areas.

Districts which had low average population per CHC are seen in 57 districts of Northeast such as Ukhrul (28,040 persons per CHC, Senapati (20,572 persons per CHC, Thoubal (47,868 persons per CHC) etc. of Manipur, Karbi Anglong (47,814 persons per CHC) and North Cachar Hills of Assam (35,314 persons per CHC), North Tripura (33307 persons per CHC) and South Tripura (35,623 persons per CHC), West Khasi Hills (39,565 persons per CHC), South Garo Hills (37,133 persons per CHC), West Garo Hills (36583 persons per CHC) of Meghalaya and Phek (36,193 persons per CHC), Kohima(32,303 persons per CHC), Peren (43,637 persons per CH) of Nagaland. Though Peren fell under low category it had only one CHC in the entire district hence the reason behind its inclusion in the category might be because of low population. Lower Dibang Valley (4,699 persons per CHC) of Arunachal Pradesh also registered the lowest population covered under CHC. While districts like Chandel, Saiha, Ri Bhoi and North point to the huge inadequacy of the health facilities provided in the respective districts due to the absence of CHC. This will hamper the availability of other facilities which are provided by CHC.

The inequalities in availability of CHC were extremely high in the districts of Northeastern states as revealed by the CV score of 78.59 (refer to AnnexureTable. No.1). This can be said from the fact that Nagaland had very high level of inequality with a CV score of 95.36 while Meghalaya had low level of inequality with a CV score of 12. 83. The CV scores revealed that Meghalaya had very low level of inequality which does not necessarily means that it had good facilities but rather the shortage of SC and PHC facility in almost all the districts as it had an average coverage above 3000 per SC and above 20000 per PHC in the state.

In the availability of healthcare services, sub-centres were found to be shortage in both hill and valley regions. But there is sufficient availability of facilities of PHC and CHC in both

the hill and valley regions. But a closer look revealed that district like Lawngtlai of Mizoram is providing healthcare services beyond its capacity. At the same time districts of Arunachal Pradesh had low population coverage per SC. In terms of PHC and CHC, Cachar and other district of Assam are highly overburdened due to high population size of the districts and the district of Arunachal Pradesh like Dibang Valley, lower Dibang Valley and districts of Sikkim has very low coverage. However, states of Nagaland and Arunachal Pradesh which has low coverage has high level of inequality which means that the healthcare facilities is still not good enough and the population norm cannot be the sole criteria for assessing the adequacy of healthcare facilities. With this argument the facilities available to support the healthcare so as to provide healthcare services are discussed in the next part of the discussion. Only with these facilities the healthcare services can be provided to the people at large.

### **3.3.2 Other indicators of availability of Physical health care services**

The other indicators were taken keeping in mind the minimal facilities required to ensure the functioning of the health facilities smoothly. Other indicators of physical infrastructure like percentage availability of regular electricity, water supply, toilet, labour room are taken as they are essential for the proper functioning of sub-centres without which ANM and other staff will not be able to perform their duties at the health centre.

#### **(i). Sub- centre**

Facilities at the sub-centre include availability of regular electricity in sub-centre, availability of regular water supply, availability of toilet facility, availability of labour room in sub-centre. These facilities are essential for ensuring adequate services being provided by ANM and in turn adequate outcome of healthcare study conducted by Jeffrey (1988)<sup>24</sup> had pointed the need of healthcare facilities like water supply, electricity, and other civic amenities as he believed that the doctors being largely drawn from urban areas have higher expectations for social amenities and physical infrastructure and hence it would be more encouraging for the doctors if amenities in the rural postings are increased so as to facilitate the stay of doctors

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<sup>24</sup> Jefferey, R. (1988). *The politics of health in India*(p. 260).Berkley, Los Angeles, London: University of California Press.



and staffs at rural or public health centres. At the same time availability of adequate water supply and electricity will ensure the smooth functioning of labour room facilities. In this light, the healthcare services of the sub-centres have been analyzed at regional and district level.

**a. Regional level**

In the regional analysis, the hill regions had higher level of ‘Other Physical Indicators of healthcare services’ as compared to the valley region with a CI of 4.34 and 3.35 respectively. The main reason for higher level of healthcare facilities may be due to high availability of physical healthcare services in Sikkim, Tripura and Mizoram.

Table No. 3.4 Availability of other physical healthcare services at regional level.

Category	Hill region	Valley region
Very High (7.92 to 9.86)( $\mu+2SD$ to $\mu+3SD$ )	Sikkim hills	NA
High (6.08 to 7.92) ( $\mu+1SD$ to $\mu+2SD$ )	NA	NA
Medium (4.19 to 6.08) ( $\mu$ to $\mu+1SD$ )	Mizoram hills, Meghalaya Hills, Tripura Hills	Nagaland valley
Low (2.30 to 4.19) ( $1SD-\mu$ to $\mu$ )	Arunachal Pradesh hills, Assam Hills, Nagaland hills.	Tripura valley, Assam valley
Very Low (0.41- to 2.30) ( $\mu-2SD$ to $\mu-1SD$ )	Manipur Hills	Manipur valley

Source: Calculated from DLHS-4 (2012-13) States wise Report. NA – Not Applicable

While at state level, Sikkim has the best infrastructure (CI 8.77) followed by Mizoram (CI 5.68) and Meghalaya (CI 5.24). While the least healthcare services is found in the state of Manipur with a CI of 1.96 which may be due to several reasons like inaccessibility, political

forces which decides everything right from resources provisioning, decisions relating to manpower distribution, to use of new technology etc.<sup>25</sup>

Amongst the hills and valley regions of Northeast the hilly state of Sikkim had very high facilities in sub-centres. This is due to very high availability of essential facilities like water supply (91.92 per cent), toilet (96.68 per cent) facility and labor room facility (98.32 per cent) facility.

Mizoram hilly region (CI 5.68), Tripura hilly region (CI 5.46) and Meghalaya hilly region (CI 5.24) were grouped under the medium category. Tripura hilly region had high supply of regular water (64.4 per cent) and medium supply of electricity (42.95 per cent), medium availability of toilet facilities (44.05 per cent) but very low availability of labour room facilities (9.95 per cent). The same can be said for Meghalaya hilly region which had medium supply of electricity (53.83 per cent) and high availability of water supply (94.09 per cent) but low availability of labour room facility (27.6 per cent).

Other regions like the Assam hilly region (CI 2.37), Arunachal Pradesh hilly region (CI 3.38), Tripura valley (CI 4.15), Assam valley region (CI 3.44) and Nagaland hilly region (CI 4.23) occupied the low category. Inclusion of these regions into the category may be due to low availability of electricity and labour room facilities as compared to the higher category region. For example, Assam hilly region had very low electricity supply (4.7 per cent), low availability of labour room facility and (13.3 per cent).

The valley (CI 1.73) and hill (CI 2.25) regions of Manipur and valley occupied very low category. This shows the availability of poor facility at the sub-centres in the hill and valley regions of Manipur. In the hill region there was no supply of electricity (zero per cent) and very poor labour room facility (14.28 per cent). While the valley regions despite medium availability of water supply (55.3 per cent) and high toilet facility (75.5 per cent) had poor supply of electricity (11.95 per cent) and very low availability labour room facility (5.32 per cent).

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<sup>25</sup> Banerjee, D. (1984). The political economy of western medicine in third world countries. In J. Mc Kinnay (Ed.), *Issues in the political economy of healthcare* (pp. 266-267). New York, London: Tavistock Publications.

There exists medium level of inequality in availability of ‘Other physical healthcare services’ at SC with a CV of 45.1 (refer to Annexure Table No.1). However, state level CV shows the existence of high inequality at SC in Mizoram (CI 72.51), Manipur (CI 48.16) while Sikkim has very low level of inequality in availability of healthcare facilities at SC.

### **b. District level**

There were six districts of Northeast which registered under high category of healthcare facilities available at district level as seen in table 3.5. The districts were East (CI 9.10), South (CI 8.97), North (CI 8.04), and districts of Sikkim with higher number of Sub-centre and also supported by high availability of regular electricity (77.45 per cent), water supply (91.93 per cent), availability of labour room (98.32 per cent) and toilet facilities (96.68 per cent). These will ensure smooth functioning of the sub-centres in Sikkim. Other districts include East Khasi Hills (Meghalaya) and Champhai (Mizoram) which had very high electricity supply (100 per cent), water supply (100 per cent) in East Khasi Hills and 100 per cent availability of toilet facilities and 95.5 per cent availability of regular water supply in Champhai.

Table No. 3.5 District wise category of availability of facilities at sub-centres.

<b>Category</b>	<b>Number of Districts</b>
Very High (7.58 to 9.37) ( $\mu+2SD$ to $\mu+3SD$ )	6
High (5.79 to 7.58) ( $\mu+1SD$ to $\mu+2SD$ )	4
Medium (4 to 5.79)( $\mu$ to $\mu+1SD$ )	24
Low (2.21 to 4)( $\mu-1SD$ to $\mu$ )	35
Very Low (0.42 to 2.21)( $\mu-2SD$ to $\mu-1SD$ )	13

Source: Calculated from DLHS-4 (2012-13) State wise report.

There were four districts in the medium category which included West Khasi Hill district (CI 7.02) of Meghalaya and Aizawl (CI 6.22) of Mizoram etc. West Khasi Hill had high electricity supply (96.3 per cent) and 100 per cent regular water supply. The same goes for the districts of Aizawl which had high electricity supply (88.9 per cent) and water supply (88.9 per cent) but medium availability of labour room (33.3 per cent) facility. These districts

are located in the hilly regions and hence adequate facilities will ensure that the proper preventive cares are being given to the population served by the particular sub-centre.

Twenty four districts were categorized under the medium category (as presented in Table No. 3.5) which included districts like East Garo Hills (CI 5.75) of Meghalaya, Dibang Valley (CI 5.51) of Arunachal Pradesh, Kiphire (CI 5.11) of Nagaland, Mamit (CI 5.11) of Mizoram, Jorhat (CI 4.61) of Assam etc. Dibang Valley has good electricity supply (66.7 per cent). Kiphire had very high water supply (90 per cent) but no toilet facilities (zero per cent) at SC. Mamit had high water supply (63.6 per cent) and high supply of electricity (78.3 per cent) and medium availability of labour room (39.1 per cent) facility. This clearly shows that poor availability in one or the other facilities might hamper the overall performance of the sub-centre. Jorhat had high water supply (79.6 per cent) and very high electricity supply (91.8 per cent) but low labour room facility (24 per cent). These districts lie in the plains areas and their poor availability of labour room suggest neglect by concerned authority.

Majority of the districts registered low availability of health infrastructure with 35 districts falling in the low category. Some of the districts include Tawang (CI 3.93), Lower Subansiri (CI 3.34), Upper Siang (CI 2.93) etc. of Arunachal Pradesh, Bongaigon (CI 3.80), Nalbari (CI 3.14), Karbi Anglong (CI 2.84) etc. of Assam. Other district like Churachandpur district (CI 2.49) of Manipur had very poor performance among all the districts in this category with no electricity supply and low availability of labour room (18.2 per cent) facilities despite high water supply (72.7 per cent) and toilet facilities (72.7 per cent). Without electricity supply, the functioning of SC is highly questionable in this district which is a part of the hilly region of the state of Manipur. The rest of the districts have poor facility of labour room which is much needed to serve the populace in the hilly terrain.

Districts like Senapati (CI 0.90), Tamenglong (CI 1.43), Bishnupur (CI 2.19) etc. districts of Manipur, Upper Subansiri (CI 0.63), East Siang (CI 2), Tirap (CI 1.89) districts of Arunachal Pradesh, North Cachar Hills (CI 1.89), Hailakandi (CI 1.60) of Assam etc. came under the lowest category. Almost all the districts of Manipur were categorized under the low category clearly pointing the huge lack of infrastructure throughout the hilly regions of the state. The same can be said for Upper Subansiri and Hailakandi which had no electricity and labour room facilities. While North Cachar Hills had low electricity supply (5.9 per cent) and

labour room (5.9 per cent) facility. All these had clearly pointed that the hilly regions are extremely lacking in basic facilities of electricity, water and labour room facilities which may be most needed in inaccessible areas with little or no connectivity to government hospitals. Thus, for the sub-centre to function smoothly, they needed to be equipped with the bare minimum facilities. Also, the co-efficient of variance is high in this region which means there are huge inequalities of basic minimal facilities in the region.

At district level too, the inequality in availability of healthcare facilities are found to be medium with a CV of 45.78(refer to Annexure Table No.1). While state wise CV reveals that high inequality exists in the states of Manipur (CI 48.16), Mizoram (CI 72.51) and Arunachal Pradesh (CI 40.69) while it is low in Sikkim (CV 6.03).

### **(ii). Primary Health Centres**

PHC is envisioned to provide both “preventive and curative cure” acting as referral unit for six sub-centres, residential quarter is a must for the qualified doctors and their staff to stay and provide services in rural areas. IIM (as cited in Jefferey, 1988)<sup>26</sup> have found that without adequate residential quarters, doctors and other paramedical staff will not be present as they are most likely to be facing problem of security. Residential quarter for the staff with their families will give a sense of security for the female workers who have often been the target of sexual harassment from their seniors and local people). Indicators taken for adequacy of PHC for providing services at optimum level include percentage availability of residential quarter, percentage availability of at least four beds in a PHC, percentage availability of regular power supply in a PHC, percentage PHC having functional vehicle. These facilities are required for the efficient functioning of PHC. Facilities like 24 hrs regular water supply, electricity at the residential quarters have been recommended by IPHS (2007).<sup>27</sup> This will ensure that the doctors and other staff stay at their place of posting as they are often discouraged by unavailability of basic amenities at PHC.

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<sup>26</sup>Jeffrey (1998), *op. cit.*, p. 272.

<sup>27</sup>Directorate General of Health Services (2007).*op. cit.* p.9.

### a. Regional

The regional level analysis reveals that hilly regions had better physical infrastructure in PHC than the valley regions with a CI of 4.19 and 3.63 respectively. This is because the hilly region likes Sikkim which had 100 per cent availability of facilities of residential quarters and 95 per cent availability of four beds at PHC crucial for providing care to patients.

Table No. 3.6 Availability of Other Physical Healthcare services at PHC.

Category	Hilly region	Valley region
Very High (5.50 to 6.89) ( $\mu+1SD$ to $\mu+2SD$ )	Sikkim Hilly region, Meghalaya Hilly region, Tripura Hilly region	NA
High (4.11 to 5.50) ( $\mu$ to $\mu+1SD$ )	Mizoram Hilly region	Tripura valley
Medium(2.72 to 4.11) ( $\mu$ to $\mu-1SD$ )	Nagaland, Assam Hilly region, Arunachal Pradesh hilly region	Assam valley, Nagaland valley
Low (1.33 to 2.72) ( $\mu-1SD$ to $2SD -\mu$ )	Manipur Hills	Manipur valley

Source: Calculated form DHLS-4 (2012-13) State wise Report. NA – Not Applicable

From the above Table No. 3.6, it is clear that the state of Sikkim (CI 6.27) and Meghalaya (CI 5.76) had the best health infrastructure falling in very high category while Manipur (CI 2.29) had the lowest. However, a deeper analysis for each regions of the state is needed to assess the actual state of the facilities at PHC. The following Table No. gives the category wise ranking of the various regions of North east India.

As stated above, the hill regions had far better health facilities in PHC than the valley region as reflected by the pattern of availability in hill and valley regions. Hilly regions in Sikkim had highest availability of facilities like 100 per cent availability of resident quarter, 95 per cent availability of four bed facility. This may be because of the economic development of the state like Sikkim and not the physiographic factor as assumed. Availability of residential quarter will ensure that the doctors posted at PHC are staying at their place of posting which lead to providing of healthcare services effectively.

Two regions were categorized under the high category which included Tripura valley region (CI 4.85) and Mizoram hill region (CI 5.28). All these regions were well developed compared to other regions in the Northeastern region.

Under Medium category lie the Nagaland hill region, Assam hill region, Arunachal Pradesh hill region, Assam valley region and Manipur valley region. The main reason for falling below other regions is the low power supply (for example 11.45 per cent in Manipur valley) and functional vehicle in the PHC's 17.68 per cent in Manipur valley).

Manipur hilly region occupied the lowest category which shows that the region had serious health infrastructure gap as compared to other regions. It has just 6.2 per cent power supply and 15.26 per cent functional vehicle. The poor infrastructure may be the product of interplay of various factors such as rough topography posing hindrance to power supply coupled with corruption in ensuring development in the region. Moreover, instead of implementing the recommendation of 10 beds at PHC (IPHS, 2007), the present norm have been diluted to only four to six beds per PHC. If the norms have been diluted to meet the shortages of availability of bed facility, the actual availability may not meet the actual requirements of the population as the present population had grown multiple times as compared to the then population in 1960's.

There exists medium inequality in availability of 'other physical healthcare' facilities at PHC as indicated by a CV of 33.7. The same pattern of medium level of inequality is found in states of Arunachal Pradesh, while there was high inequality in Mizoram (CI 44.02) and low inequality in Sikkim (CV 17.36), Tripura (CV 9.16) and Assam (CV 9.16)(refer to Annexure Table No.1).

## b. District wise

Table No. 3.7 Category of Other Physical Infrastructure at PHC.

Category	No. of Districts
Very High(5.5 and above)( $\mu+1SD$ and above)	18
High (4 to 5.5) ( $\mu$ to $\mu+1SD$ )	18
Medium (2.5 to 4)( $\mu$ to $\mu-1SD$ )	33
Low (1 to 2.5)( $2SD -\mu$ to $\mu-1SD$ )	12
Very Low (Below 1)( Below $\mu-2SD$ )	1

Source: Calculated from DLHS-4 (2012-13) State wise Report.

There were altogether 18 districts in Northeast that fall under very high category of healthcare facilities available at PHC as categorized in Table No. 3.7. Some of the districts are Changlang (CI 6.79) of Arunachal Pradesh, South Garo Hills (CI 6.79), and West Garo Hills (CI 5.91) etc. of Meghalaya, Aizawl (CI 6.79) of Mizoram and North Tripura (CI 5.51) Tripura. These are mainly the hill districts except Lakhimpur. Changlang had very high availability of residential quarter, functional vehicle, PHC with at least four beds and regular power supply with 100 per cent each. The same goes for districts of Meghalaya and Assam and Tripura although the facility for residential quarter is moderate in Dhalai (45.5 per cent).

There were 18 districts in the high category of health facilities in Northeastern region. Some of the districts include Ri Bhoi (CI 5.47), East Garo Hills (CI 5.43) of Meghalaya, and West Tripura (CI 4.66) of Tripura, Upper Siang (CI 4.53) of Arunachal Pradesh, Kohima (CI 4.06) and Tuensang of Nagaland. There is very high availability of four beds facility (100 per cent in Ri Bhoi and functional vehicle 71.4 per cent in East Garo Hills) in the PHC of Meghalaya, while there is no power supply at all in Upper Siang of Arunachal Pradesh. While there is high availability of four bed facility (85.7 per cent) and medium availability of residential quarters (57.1 per cent) in West Tripura. Meanwhile, in Tuensang and Kohima there was 80 per cent availability of functional vehicle in Tuensang while Kohima had 85.7 per cent availability of residential quarter.



Thirty three districts of Northeast India occupied the medium category. The districts included most of the districts of Assam such as Cachar (CI 3.64), North Cachar Hills (CI 3.63), Kamrup (CI 3.66) etc., Lower Subansiri (CI 3.85), East Siang (CI 3.31), West Kameng (CI 3.59) etc. of Arunachal Pradesh. Tamenglong (CI 3.09), Imphal West (CI 3.08) of Manipur, East Khasi hills (CI 3.71) of Meghalaya etc. The districts lying in plain areas of Assam such as Kamrup, lack behind in availability of functional vehicle (23.8 per cent) in a PHC. Hill districts like North Cachar Hills has medium availability (50 per cent and above) in all the facilities that should be available at a PHC. Lower Subansiri, East Siang also had no power supply, West Kameng had low availability of functional vehicle. While both the hill and valley districts of Manipur and hill district of Meghalaya lacked power supply (less than 26 per cent and functional vehicle (less than 26 per cent) which may be due to lack of development in the region.

While 12 districts of Northeast registered low availability of 'other indicators' of physical healthcare facilities in PHC as presented in Table No. 3.7. Some of the districts are Bishnupur (CI 2.41), Thoubal (CI 2), Senapati (CI 1.59), Chandel (CI 1.61) etc. of Manipur, Lower Dibang Valley (CI 1.57), Kurung Kumey, Tirap etc. of Arunachal Pradesh, etc. It is to be noted that both the hill districts and valley districts of Manipur are lacking in almost all the facilities required for a PHC to function like regular power, functional vehicle etc. There is no power supply in the PHC's of Ukhrul, Chandel etc. reflecting the huge lack of infrastructure in the state. While the hilly districts of Arunachal Pradesh had no power supply and four beds facility in the PHC existing there. Shortage of one or the other essential facilities at PHC will reduce the efficiency of the facility apart from discouraging the staff to stay at the residential quarters provided to them. This will compromise the quality of healthcare services provided at PHC.

The district with the least facility in Northeast is Upper Subansiri of Arunachal Pradesh which had no power supply, functional vehicle, beds and poor condition of residential quarters. There was medium inequality in availability of facilities at district level with CV of 37.61(refer to Annexure Table No.1). The same pattern of medium level of inequality was found in states of Arunachal Pradesh, while there was high inequality in Mizoram (CI 44.02) and low inequality in Sikkim (CV 17.36), Tripura (CV 9.16) and Assam (CV 9.16).

### **(iii). Community Health Centre**

The indicators taken at CHC include availability of functional operation theatre, availability of new born care services and availability of blood storage facility. The indicators taken at CHC is well justified in the sense that as per the norms laid down IPHS (2007)<sup>28</sup>, it is mandatory for a CHC to have Operation theatre as this centre acts as provider of specialist services and hence the need for operation may arise. For this operation theatre to function properly, it is also necessary to have a blood storage camp for supply blood patients in operation theatre or other. Therefore, these three indicators had been taken to highlight the level healthcare services in the region.

#### **a. Regional level**

Availability of facilities at CHC at regional level was found to be more in valley region than in hilly region as indicated by the CI of 3.55 in valley region and 2.78 in hill region. While state wise ranking showed that Mizoram (7.03 CI), Assam (3.66) and Nagaland (3.60 CI) came first, second and third respectively. While states like Sikkim (0.35), Tripura (0.61), Arunachal Pradesh (1.39 CI) had the least facility at CHC. Manipur had average facility of Operation theatre (OT) and blood storage at CHC with a CI of 2.46.

The two regions of hills and valley region of Northeast had further been classified into separate 12 sub-regions of hills and valleys of each state. These sub-regions of different states had been categorized into five categories viz. very high, high, medium, low and very low.

Mizoram hilly region (CI 7.03) had very high category in availability of operation theatre (87.5 per cent), new born care centre (87.5 per cent) but low availability of blood storage facility (18.75 per cent). This will handicap the proper functioning of operation theatre at CHC. Nagaland valley region (CI 5.93) occupied high category which had at least one functional OT and New born care centre in all the CHC present in the Dimapur district. But it had no facility of blood storage which is crucial for the proper functioning of OT.

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<sup>28</sup>Directorate General of Health Services (2007).*op. cit.*, p. 5.

Table No. 3.8 Availability of Other Physical Healthcare services at CHC.

Category	Hilly region	Valley region
Very High (6.96 and above) ( and above $\mu+2SD$ )	Mizoram hilly region	NA
High (4.86 to 6.96) ( $\mu+1SD$ to $\mu+2SD$ )	NA	Nagaland valley region
Medium (2.76 to 4.86) ( $\mu$ to $\mu+1SD$ )	Nagaland hilly region, Manipur Hilly region, Assam Hilly region	Assam valley regions
Low (0.66 to 2.76) ( $\mu-1SD$ to $\mu$ )	Meghalaya hills, Arunachal Pradesh hilly region	Tripura valley region, Manipur valley region
Very Low (Below 0.66) (Below $\mu+2SD$ )	Sikkim hilly region	Tripura Hilly region

Source: Calculated from DLHS-4(2012-13) State wise Report. NA – Not Applicable

Nagaland valley region (CI 5.93) and hilly region (CI 3.36), Manipur hilly region (CI 3.12) and Assam hilly region (CI 2.83) occupied the medium category. Nagaland hilly region had very high availability of new born care centre, comparatively lesser availability of OT and no facility of blood storage facility except for Tuensang region. Manipur hilly had no facility of OT (except Senapati) and blood storage (except Tamenglong) in all the sub-regions of the state. While Assam had very low availability of OT, high availability of new born care centre (65 per cent) and low availability of blood storage centre (5 per cent). Without availability of OT and other essential facilities at CHC, the role of CHC in providing emergency cases in surgery and other routine cases will be compromised. IPHS (2012)<sup>29</sup> had laid down the requirement of one OT for handling of emergency cases like “intestinal Obstruction, Hemorrhage and normal cases like Hernia, Hydrocele, Appendicitis” etc.

Hilly regions of Meghalaya (CI 2.54), Arunachal Pradesh (CI 1.39) and Valley regions of Tripura (CI 1.22) and Assam (CI 3.74) were categorized in the medium category. These regions had low facility of OT (for example Meghalaya had only 10.71 per cent availability

<sup>29</sup>Directorate General of Health Services (2007).*op. cit.*, p. 4.

of OT) and new born care centre but some facility of blood storage (zero per cent in Arunachal Pradesh hilly region).

Hilly regions of Sikkim (CI 0.35) and Tripura hilly region (CI 0.00) occupied low category as these regions had no facility of OT and Blood storage at CHC. This may be due to hilly terrain or poor emphasis on development of CHC in the region. The unavailability of OT and blood storage facility is a huge shortage in terms of availability of healthcare facilities which will lead to poor availability of healthcare services. This will render the infrastructure functionless and lead to wastage of public money.

It may be noted that Sikkim hilly region had very low facility of CHC itself in half of the districts. At the regional level, inequality in availability of ‘other physical healthcare’ facilities in CHC was very high with a CV of 63.30.

#### **b. District level**

Table No. 3.9 Category of Physical Health Care Services at Community Health Centre.

Category	No. of districts
Very High (12.06 and above) ( $\mu+3SD$ and above)	1
High (9.04 to 12.06) ( $\mu+2SD$ to $\mu+3SD$ )	2
Medium (6.02 to 9.04) ( $\mu+1SD$ to $\mu+2SD$ )	7
Low (3.00 to 6.02) ( $\mu$ to $\mu+1SD$ )	22
Very Low (Below 3.00) (Below $\mu$ )	50

Source: Calculated from DLHS-4 (2012-13) State wise Report.

The facilities available at CHC were poor as shown by the distribution of the various districts in the different categories with very high concentration in the very low and low categories altogether 72 out of 82 districts in the whole region. Only one registered very high availability of health facilities at CHC which is Serchhip (CI 15.78) of Mizoram. It had functional operation theatre, new born care centre along with blood storage facility which is 100 per cent each in all the indicators.

There were only two districts lying in the high category i.e., Tamenglong and Aizawl districts of Manipur and Mizoram respectively as seen in table no. 3.9. Tamenglong had no

functional operation theatre which is mandatory for a CHC as recommended by IPHS (2007)<sup>30</sup>. But it did have very high facility of new born care centre (100 per cent) and blood storage centre (100 per cent). The availability of blood storage facility without functional operation theatre is wastage of resource. While Aizawl had very high availability of OT (100 per cent) and new born care centre (100 per cent) but medium availability of blood storage (50 per cent) which needs to be increased for the efficiency of OT.

Seven districts of Northeast were categorized under Medium category which included Tuensang (CI 8.58) of Nagaland, Sibsagar (CI 7.19), Barpeta (CI 7.07), Nagaon (CI 6.94) of Assam, West Khasi Hills (CI 6.32) and Jaintia Hills (CI 6.12) districts of Meghalaya. Tuensang had very high availability of facility of new born care centre (100 per cent), medium availability of blood storage (50 per cent) and OT (50 per cent) facility. While Assam had zero per cent availability of functional OT (Sibsagar), very high availability of new born care centres (94.73 per cent in Nagaon) and medium availability of blood storage facility (53.84 per cent in Barpeta). West Khasi hills had no functional OT despite high availability of other facility.

There were 22 districts in the low category which comprised of Mamit (CI 5.93) of Mizoram, Dimapur (CI 5.93) of Nagaland, Kamrup (CI 4.18) and Karbi Anglong (CI 3.36) of Assam etc. Mamit had very high facility of functional OT (100 per cent) and new born care centre (100 per cent) but no facility of blood storage which will reduce the efficiency of OT. While Mon and Karbi Anglong had no facility of OT and blood storage.

Majority of the districts occupied the very low category (50 districts) which were Senapati (CI 2.96), Imphal West (CI 1.39) of Manipur, Bongaigon (CI 1.08) etc. of Assam, West Garo Hills (CI 2.53) etc. of Meghalaya, South Tripura (CI 1.04) of Tripura, South district (CI 1.39) of Sikkim, Papum Pare (CI 0.70) of Arunachal Pradesh.

Among the district West Garo Hill did not have any blood storage facilities despite the availability of OT (25 per cent) facility which means that the OT is not fully functional due to non-supply of blood at time of operation. This will lead huge in inefficiency of the CHC present there. South Tripura did not have any OT and blood storage facility despite high

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<sup>30</sup>Directorate General of Health Services (2007).*op.cit.*, p. 5.

availability of new born care centre (100 per cent). This means that the CHC as a facility had remained non-functional in these districts which are a waste of public money

In terms of inequality there existed very high inequality amongst the districts in availability of at CHC at the district level as the CV score of 78.59 suggest. The region wise inequality in availability of ‘other physical healthcare’ facilities in CHC was very high with a CV of 73.27. However, due to limitations of the data, the CV for each state has not been calculated.

The district level analysis reveals that the facility of CHC is lying without proper use due to unavailability of proper equipment and support facilities. It needs to be upgraded to meet the requirements of population especially in inaccessible areas which have no access to proper hospitals for miles. At the same time, the CHC as a facility may not be preferred in urban areas or areas which have access to government hospitals at less distance. At least in rural areas it should be properly equipped to provide preventive, curative and specialists services.

#### **iv. District Hospital**

The indicators taken at District Hospital include percentage availability of ultrasound facility, percentage availability of critical care area. These indicators of district hospital have been taken as per the guidelines of IPHS (2007)<sup>31</sup>. However, due to unavailability of unit level data only few indicators had been taken. The indicator like critical care has been taken as district hospital is the main hospital in the districts which will provide both curative and preventive care to population of the district as well as other outpatients who may be referred for the critical care provided by other hospitals. Meanwhile, ultrasound facility is a must for any healthcare facilities of the level of district hospital as it will aid in diagnosis and providing curative services. Accordingly its availability has been discussed at regional and district level in the following paragraphs.

##### **a. Regional level**

The valley region had average score of composite index of ‘Other Physical healthcare services’ at District hospital of 0.81 while the hilly region had a composite score of 0.60 which means that the valley region had better facilities at DH than the hills. This is because

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<sup>31</sup>Directorate General of Health Services (2007), *op. cit.*, p. 3.

the district hospital in valley region has at least one facility of ultrasound in each sub-region. The critical care facility was also more or less present in majority of the sub-regions especially the Assam plains as compared to the hilly areas. Coming to states, Mizoram (CI 7.03) had the highest healthcare services in the Northeast followed by Assam (CI 3.66) and Nagaland (CI 3.60) in the second and third position respectively. While lowest health care services was found in the states of Sikkim (CI 0.35) and Arunachal Pradesh (CI 1.39).

To give a better picture of the healthcare services, the two regions had further been divided into 12 sub-regions of the various states which are categorized into four category high, medium, low and very low and are explained as follows:

Table No. 3.10 Availability of Other Physical Healthcare services at DH across regions.

Category	Hills	Valleys
High (0.97 and above) ( $\mu+1SD$ and above)	Sikkim hilly region	Tripura valley
Medium (0.64 to 0.97) ( $\mu$ to $\mu+1SD$ )	Mizoram hilly region	Assam valley, Nagaland valley
Low (0.31 to 0.64) ( $\mu-1SD$ to $\mu$ )	Nagaland Hilly region, Assam Hilly region, Manipur hilly region, Meghalaya hilly region, Arunachal Pradesh hills	Manipur valley
Very Low (Below 0.31) (Below $\mu-1SD$ )	Tripura hilly region	NA

Source: Calculated from DLHS-4 (2012-13) State wise Report. NA – Not Applicable

The Tripura valley region and the Sikkim hilly region had the best physical infrastructure amongst the hill and valley region of Northeast. The plain region consists of the West Tripura and South Tripura. These regions had at least one facility of ultrasound and critical care in the district hospitals present in the regions. Furthermore, districts which are well connected

with national highway No.44 and are comparatively well developed than the eastern part of Tripura marked by hilly terrain.

Three regions occupied the high category which included Mizoram hilly region, Assam hilly region and Nagaland valley region. Despite the hilly terrain, the Mizoram hilly region had very high availability of ultrasound facility (100 per cent) while there is no critical care facility. Meanwhile, Assam valley region had high availability of ultrasound facility (78.5 per cent) and critical care facility (59.52 per cent). Nagaland plains consist of the plains in Dimapur district which had high availability of ultrasound sound facility (100 per cent) but no critical care facility.

The hilly regions of Nagaland, Assam, Manipur, Meghalaya and Arunachal Pradesh were categorized in the low category as presented in table no. 3.10. These hilly regions had high availability of facility (example 70 per cent in Nagaland hilly region) of ultrasound but had no facility of critical care. Meghalaya hilly region consist of the Khasi, Jaintia, Garo hills etc. Except for West Garo Hills, East Garo Hills and West Khasi Hills, the rest of the sub-regions had at least one facility of Ultrasound and critical care which might determine the performance of the whole region. The Manipur valley region also came under low category which had low availability of ultrasound facility (25 per cent) and critical care.

The very low category was occupied by Tripura hilly region which had no facility of ultrasound or critical care. The inequality of availability between hill and valley regions had been found to be lying in medium range with a CV of 39.18.

#### **b. District level**

The sub-regions of the state are further classified for the purpose of deeper analysis into various districts of Northeast and care categorized further at district level.

Before beginning the analysis, it is to be noted that the availability of critical care facility and ultrasound facility in the whole northeast is very low. In fact, a few districts have maximum two critical cares or ultrasound facility while the rest of the district has no facility at all. Despite the limited data these indicators have been taken as proxy indicators for availability of facilities at DH to highlight their appalling condition.



Table No. 3.11 Availability of Other Physical Healthcare services at DH across districts.

Category	No. of districts
High (1.15 and above) ( $\mu+1SD$ and above )	24
Medium (0.67 to 1.15) ( $\mu$ to $\mu+1SD$ )	29
Low 0.19 to 0.67 ( $\mu-1SD$ to $\mu$ )	6
Very Low (Below 0.19) (Below $\mu-1SD$ )	23

Source: Calculated from DLHS-4 (2012-13) State wise Report.

There were 24 districts occupying the high category of availability of healthcare facilities at District hospital. The districts were Papum Pare of Arunachal Pradesh, Thoubal district of Manipur, East Khasi Hills of Meghalaya, Serchhip of Mizoram, Kohima of Nagaland, South, district of Sikkim, West Tripura of Tripura, Karbi Anglong etc. of Assam. All of the districts had high facilities of ultrasound district (100 per cent) and critical care (100 per cent) in the district hospital.

There were 29 districts of Northeast in the medium category such as West Kameng, Lower Subansiri, East Siang etc. of Arunachal Pradesh, Tuensang, Dimapur, Phek etc. of Nagaland, Ri Bhoi, Jaintia Hills, South Garo Hills etc. of Meghalaya, Senapati and Churachandpur of Manipur etc. had a CI of 0.76. The district hospitals in these districts mentioned above had no facility of critical care.

Six districts of Northeast came under the low category which were East Kameng (Arunachal Pradesh), Chandel (Manipur), Mon (Nagaland), Bongaigon and Golaghat (Assam) which had at least one facility of critical care but no facility of ultrasound in the district hospital of all the districts.

While 23 districts of Northeast occupied the very low category such as Tawang, Upper Subansiri, West Siang of Arunachal Pradesh, Bishnupur, Imphal West, Imphal East, Tamenglong, Ukhrul etc. of Manipur, West Garo Hills, East Garo Hills and West Khasi hills of Meghalaya. These districts have no facility of ultrasound and critical care at all.

The CV of 29.57 suggests the existence of medium level of inequality in terms of ‘Other Physical Infrastructure’ in the districts of Northeast which is also seen at the regional level with a CV of 39.18. The level of inequality is also at DH cannot calculated as so many states had zero per cent availability of one or the other indicators. However, despite data limitation, regional variation in availability is shown as the main purpose of the study is to highlight the lack of healthcare facilities and services.

### **3.4 Patterns of availability of Human Resources at Sub-centres, Primary Health Centres, Community Health Centres and District Hospitals**

Health workers are the heart and soul of the health care system ensuring critical care to patients, providing preventive and curative cure. Quality of health care system can be determined by the availability of adequate health workers. They are increasingly becoming important with emergence of new diseases like Ebola, mental health diseases and increasing cases of non-communicable diseases. They are especially important in remote and hilly regions of Northeast India where chances of outbreaks of epidemics are more than the non-communicable diseases. A study by WHO (2006)<sup>32</sup> have shown variation in availability of health workers across regions with African region having only 2.3 doctors per 1000 population, South- East Asia 4.3 doctors per 1000 and Americas having 24.8 doctors per 1000 population. Most often regions in need of health workers are having the least health worker than countries which have sufficient health workers. The set of indicators dealing with human resources at various centres is one of the most crucial indicators of the quality of health care facilities available as it will determine the efficiency of the facilities in accordance to the role to be played by them in providing preventive and curative care services.

#### **3.4.1 Patterns of availability of Human Resources at Sub-centres**

The human resources taken at sub-centre include percentage availability of ANM in sub-centre, percentage availability of MHW in sub-centre. At sub-centre, the most critical role is

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<sup>32</sup>WHO (2006). Working together for health. Geneva: World Health Organization.

played by ANM and MHW who provides medicine for curing of ailments as well as maternal and child care services in the village. Since, they act as the ‘first contact point between patient and health care services’<sup>33</sup>, a well trained ANM/MHW is a must for referring to higher level of healthcare. The role of ANM is to provide maternal and child healthcare services along with family planning services although not necessarily limited to them. As the service provided by ANM will affect the health of mother and child which is a part of health of the population, ANM has been taken as one of the indicator to assess the availability of human resource. The availability of these health workers will influence the outcomes of health through curative and preventive care provided by them. The patterns of availability of human resources at sub-centres are analyzed from regional, sub-regional to district level.

#### **a. Regional level**

The regional level analysis deals with the hills and valley part of Northeast, the two major divisions are made for the sole purpose of analyzing spatial aspect of health. The composite index value revealed that the valley region of Northeast fared better than the hilly region with an average CI of 2.70 which is 2.08 for the hill region.

At state level, Sikkim (3.30 CI), Mizoram (2.80 CI) and Assam (2.69 CI) had the first, second and third best facility of human resources in the SC of Northeastern region. While Meghalaya (1.32 CI) and Nagaland (1.80 CI) had one of the lowest availability of human resources and the state of Manipur (CI 2.17) and Arunachal Pradesh (1.93) occupied medium ranks. These states are further divided into 12 sub-regions for a more detailed analysis of the availability of human resources at sub-centres.

Hilly region of Sikkim (CI 3.30) occupied the very high category as it had very high availability of Auxilliary Nurse and Midwife (ANM) (88.75 per cent) and Multipurpose Health Worker (MHW) (85.83 per cent) in all the districts of the region. On the other hand, regions under the high category had high availability of ANM but comparatively low availability of MHW. Imphal valley has almost 100 per cent availability of ANM. The regions which were categorized under high category include Hilly regions of Assam (CI 2.89), Mizoram (CI 2.80), and Valley regions of Tripura (CI 2.72), Nagaland (CI 2.65),

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<sup>33</sup>Directorate General of Health Services (2007).*op. cit.*, p. 10.

Manipur (CI 2.83) and Assam (CI 2.69). The high availability of ANM ensures that the maternal and child healthcare services along with family planning work are provided to the population at large.

Hilly regions of Tripura (CI 2.22) and Arunachal Pradesh (CI 1.98) were categorized into medium category with high availability of ANM (55 per cent) and MHW (59.55 per cent) in Tripura hilly region while Arunachal Pradesh hilly region had higher percentage of ANM (66.49 per cent) than MHW (45.83 per cent).

Table No. 3.12 Category of availability of human resources at Sub-centres across regions.

Category	Hill Region	Valley Region
Very High (3.01 to 3.62) ( $\mu+1SD$ to $\mu+2SD$ )	Sikkim hills	NA
High (2.4 to 3.01) ( $\mu$ to $\mu+1SD$ )	Assam hills, Mizoram Hilly region	Manipur valley, Tripura Valley Region, Assam Valley region, Nagaland valley region
Medium (1.79 to 2.4) ( $\mu-1SD$ to $\mu$ )	Tripura Hilly region, Arunachal Pradesh Hilly region	NA
Low (1.18 to 1.79) ( $\mu-1SD$ to $\mu-2SD$ )	Meghalaya Hilly region, Nagaland hilly region. Manipur hilly region	NA

Source: Calculated from DLHS-4 (2012-13) State wise Report. NA – Not Applicable

Hilly regions like those of Meghalaya (CI 1.32), Manipur (CI 1.64) and Valley region of Nagaland (CI 2.65) occupied the low category as it had very low availability of MHW (6.87 per cent) and no personnel of MHW in Nagaland valley region. It is seen that the difference in category is due to the variation in availability of Male Health Worker reflecting possible cultural gap between the different regions. The CV (25.37) revealed that there was low inequality in availability of human resources among the regions. This is reflected in the stateswise inequality in availability human resources with Meghalaya having a CV of 2.01 and Mizoram having a CV of 8.52(refer to Annexure Table No.1).

## b. District level

A deeper analysis of the various districts will give a better insight into the shortages of human resources in the region. For the purpose of further analysis at district level of the various sub-regions, the districts have been grouped into five categories shown in the Table No. 3.13.

Twelve districts were categorized into the very high category which include East district (CI 3.57) of Sikkim, Jorhat (CI 3.51), Lakhimpur (CI 3.24), and North Cachar Hills (CI 3.09) etc. of Assam, Thoubal (CI 3.31) and Bishnupur (CI 3.22) of Manipur. Among the district East district had the highest availability of ANM and MHW with both the indicators having 93.8 per cent availability. Thoubal, Bishnupur and Lakhimpur belonging to the valley region had 100 per cent availability of ANM. While the hill districts like North Cachar Hills also had 100 per cent ANM and East district had above 90 per cent availability.

Table No. 3.13 Availability of human resources at Sub-centres across districts.

Category	No. of Districts
Very High (3.01 and above)( $\mu+1SD$ and above)	12
High(2.29 to 3.01) ( $\mu$ to $\mu+1SD$ )	35
Medium (1.57 to 2.29) ( $\mu-1SD$ to $\mu$ )	16
Low (0.85 to 1.57) ( $\mu-1SD$ to $\mu-2SD$ )	18
Very Low (Below $\mu-2SD$ )(Below 0.85)	1

Source: Calculated from DLHS-4 (2012-13) State wise Report.

There were 35 districts in the high category which include Marigaon (CI 2.98), Goalpara (CI 2.94), Karbi Anglong (CI 2.69) etc. of Assam, West Siang (CI 2.29), East Siang (CI 2.54), Papum Pare (CI 2.48) etc. of Arunachal Pradesh, Imphal East (CI 2.48), Imphal West (CI 2.31) etc. of Manipur; Dimapur (CI 2.65), Phek (CI 2.39) etc. of Nagaland which had high availability of ANM (96.1 per cent in Marigaon) and high availability of MHW in West Siang (75 per cent).

There were 16 districts occupying the medium category which included the districts of Peren (CI 2.25), Kohima (CI 2), Tuensang (CI 2.09) etc. of Nagaland, Upper Siang (CI 2.25), and

Tawang (CI 2.25) of Arunachal Pradesh, Senapati (CI 1.95), Ukhrul (CI 1.86) districts etc. of Manipur etc. All of these districts except Tawang had very high availability of ANM for example Peren had 100 per cent availability and medium availability of MHW (41.7 per cent). Tawang had very low availability of ANM (25 per cent) and medium availability of MHW (50 per cent).

There were 18 districts in the very low category which include Zunheboto (CI 1.56) of Nagaland; Chandel (CI 1.55), Churachandpur (CI 1.49), Tamenglong (CI 1.36) etc. of Manipur, Jaintia hills (CI 1.46), Ri Bhoi (CI 1.23), South Garo Hills (CI 1.14) etc. of Arunachal Pradesh, Lower Dibang Valley (CI 1.36) of Arunachal Pradesh etc. Amongst these districts South Garo Hills had no MHW in sub-centres while the rest had very low availability of MHW (for example Ri Bhoi had just 3.3 per cent availability of MHW).

There was only one district i.e., Dibang Valley occupying the very low category which had very low availability of ANM and no MHW personnel in the sub-centres. The whole distribution of ANM (33.3 per cent) and MHW represents a huge shortage of male nurse throughout the sub-centres of Northeast.

Though there is more or less adequate number of ANM in the Sub-centres of the region as a whole for the better efficiency in providing the services to people, inadequacy of MHW in the centres hampered the performance of healthcare facilities to a great extent. And it is reflected through medium category of inequality (CV 31.50) persisting in the availability of human resources in the sub-centres of the Northeastern region. Except for Arunachal Pradesh (CV 45.05), the rest of the states had low inequality in availability of ANM and MHW at SC while Manipur had very low inequality with CV of 3.13 (refer to Annexure Table No. 1). The same pattern of low inequality can be seen in regional level also.

### **3.4.2 Patterns of availability of Human Resources at Primary Health Centres**

The important indicators of human resources reflecting the quality of PHC includes percentage availability of Medical officers, Lady Medical Officers and Pharmacists. It is mandatory for a PHC to be manned by Medical officer (MO) as it is meant to provide

curative and preventive services. Meanwhile, Lady Medical officer (LMO) is needed for providing maternal and family planning healthcare services to the patients.<sup>34</sup>

**a. Regional level**

The human resources at PHC were found to be better in the valley regions than the hilly region with a composite index of 2.24 and 1.87 respectively. The Valley regions of Manipur and Assam region were having high availability of human resources than the rest of the regions with high availability of Medical officer (MO) and pharmacists.

Coming to the state Manipur had the best human resources available with CI of 3.08 followed by Meghalaya (CI 2.90), Tripura (CI 2.84) and Sikkim (CI 2.44). States with low human resources in the PHCs include Arunachal Pradesh (CI 1.24), Nagaland (CI 1.44), Mizoram (CI 1.54) and Assam (CI 2.04).

Table No. 3.14 Availability of human resources at PHC across regions.

Category	Hill Region	Valley Region
High (3.13 and above) ( $\mu+1SD$ and above)	NA	Manipur valley, Tripura Valley Region
Medium (2.38 to 3.13) ( $\mu$ to $\mu+1SD$ )	Assam hills, Tripura Hilly region, Meghalaya Hills, Sikkim Hilly region, Manipur hilly region	Nagaland valley region
Low (1.63 to 2.38) ( $\mu-1SD$ to $\mu$ )	NA	Assam Valley region
Very low (1.63 and below) ( $\mu-1SD$ and below)	Arunachal Pradesh Hilly region, Nagaland Hilly region, Mizoram Hilly region	NA

Source: Calculated from DLHS-4 (2012-13) State wise Report. NA – Not Applicable

<sup>34</sup>Directorate General of Health Services (2007).*op. cit.*, p. 9.

Amongst the hill and valleys regions of Northeast, the valley region of Manipur (CI 3.64) and Tripura (CI 3.47) occupied the high category and had high availability of Lady MO and Pharmacists. These regions had high availability of Lady MO (100 per cent) and MO (80 per cent in valley regions of Manipur which was comparatively lower in valley region of Tripura with 77 per cent). From Table no. 3.14, regions like Arunachal Pradesh Hilly Region, Nagaland Hilly region, Mizoram hilly region and Nagaland valley region occupied very low category.

Hilly regions like the Sikkim hills (CI 2.44), Assam hilly region (CI 2.97), Meghalaya hilly region (CI 2.90) etc. occupied the medium category. These regions had high availability of Lady Medical officer (52.5 per cent in Sikkim) and the MO (69.28 per cent).

Only one region i.e., Assam Valley region occupied the low category which had low availability of Lady MO (30.22 per cent) as compared to MO (91.53 per cent) and Pharmacists (67.04 per cent). The low availability of Lady MO shows the unavailability of skilled doctors for giving out reproductive healthcare services which the main objective of PHC's, CHC's.

The Arunachal Pradesh hilly region had low category of lady MO (19.56 per cent) and pharmacists (27.82 per cent) while Nagaland hilly region had low availability of lady MO and better availability of lady MO (10.15 per cent). Human resources availability at regional level was highly unequal as revealed by a CV of 49.05 (refer to Annexure Table No.1). The same pattern can be seen in states wise CV with Arunachal Pradesh having high inequality with a CV of 87.12 per cent and Nagaland having a CV of 51.17.

#### **b. District Level**

At district level, only three districts occupied the very high category in availability of human resources in PHC. The districts were the valley districts of Imphal West (CI 4.26) of Manipur, the hill district of North Cachar Hills (CI 4.26) in Assam and West Tripura (CI 4.08) of Tripura. Here, Imphal West district had 100 per cent availability of MO, lady MO and pharmacists possibly due to the fact that Imphal is the capital city of Manipur and hence ample facilities to attract the workers to stay at the PHC designated to them. West Tripura had 100 per cent availability of MO and very high availability of Pharmacists (85.7 per cent)



and lady MO (85.7 per cent). Lastly, North Cachar Hills also had very high availability of Lady MO (100 per cent) and Pharmacists (100 per cent).

Seven districts occupied the high category such as Imphal East (CI 3.88), Thoubal (CI 3.70), Chandel of Manipur, Papum pare (CI 3.65), East Siang (CI 3.12) of Arunachal Pradesh, South Garo Hills (CI 3.75) of Meghalaya, Sibsagar (CI 3.61) of Assam. Among the districts, Imphal East had very high availability of MO (100 per cent) and Lady MO (80 per cent) and Pharmacists (87.5 per cent each) while East Siang had comparatively lesser availability of MO (77.8 per cent) and Lady MO (71.4 per cent).

Table No. 3.15 Availability of human resources at PHC across districts

Category	No. of districts
Very High (4.0 to 5.0) ( $\mu+3SD$ to $\mu+4SD$ )	3
High (3.0 to 4.0) ( $\mu+2SD$ to $\mu+3SD$ )	7
Medium (2.0 to 3.0) ( $\mu+2SD$ to $\mu+1SD$ )	31
Low (1.0 to 2.0) ( $\mu+1SD$ to $\mu$ )	28
Very Low (0 to 1) ( $\mu$ to $\mu-1SD$ )	14

Source: Calculated from DLHS-4 (2012-13) State wise Report.

Majority of the districts (31 in number) occupied the medium category. These are occupied by the hill districts of Manipur like the Churachandpur (CI 2.95), Ukhrul (CI 2.23), Tamenglong (CI 2.23) etc., East Khasi Hills (CI 2.94), East Garo Hills (CI 2.69), Ri Bhoi (CI 2.80) etc. of Meghalaya, Kamrup (CI 2.14), Sonitpur (CI 2.09), Dhemaji (CI 2.64) etc. of Assam, Kohima (CI 2.52), Peren (CI 2.08) of Nagaland. Amongst the districts Churachandpur had high availability of MO (100 per cent) while Ukhrul had very low availability of Lady MO (33.3 per cent). East Khasi hill and the Jaintia hill districts had very high availability of Pharmacists (100 per cent each) and lesser availability of Lady Medical Officer (66.7 and 56.3 per cent for East Khasi Hills and Jaintia Hills).

Twenty eight districts occupied the low category which consisted of Kurung Kumey (CI 1.97), Changlang (CI 1.74), Lohit (CI 1.21) etc. of Arunachal Pradesh, Jorhat (CI 1.80), Karbi Anglong (CI 1.68), Bongaigon (CI 1.57) etc. of Assam, Mon (CI 1.52), Phek (CI 1.11), Mokokchung (CI 1.10) of Nagaland etc. These districts had low availability of Lady MO (for

example just 15.4 per cent in Karbi Anglong) and high availability of MO with Karbi Anglong, Kurung Kumey, Changlang etc having 100 per cent availability. However, Kurung Kumey and Mokokchung had zero per cent availability of Lady MO.

Districts like Lower Dibang Valley (CI 0.30), Lower Subansiri (CI 0.91), Anjaw (CI 0.24) etc. of Arunachal Pradesh, Saiha (CI 0.81), Lawngtai (CI 0.61) etc occupied the very low category. Among these districts, Lower Dibang Valley had zero per cent availability of Lady MO and Anjaw had zero per cent availability of pharmacists. The sole reason behind the lack of lady MO might be to insecurity to lady doctors. The lack of doctors may be due to that insecurity in rural areas due to lack of social and physical infrastructure needed to attract the urban middle and upper class doctors to the posting area IIM (as cited by Jefferey, 1988).<sup>35</sup>

The availability of the Medical Officers in PHCs in the North East India seems to quite good which was around 83 per cent and lack of Lady Medical Officers may be a problem among women and girl patients who prefers lady MO than male MO. On an average there is only 32 per cent availability of Lady MO in the entire region of Northeast which must be adequately filled up to provide services to the patients along with ensuring security. Apart from shortage of staff there was also a case of high availability like the 64 per cent availability of pharmacists in the PHCs which is also very important staff member in running the centres and providing medicines along with guidance for taking the medicine in time.

The inter-district inequality (CV 31.68) in the availability of human resources personnel in PHCs was at medium level of as the CV value was within the range of 20-40. However, Arunachal Pradesh (CV 87.13) and Nagaland (CV 57.17) which are known for their low population coverage had very high level of inequality at state level. This shows that the health care facilities need to be provided so as to address the larger issues of inequality.

### **3.4.3 Patterns of availability of Human Resources at Community Health Centres**

Indicators taken to assess the quality of human resources include percentage availability of Obstetricians/Gynecologists, percentage availability of Pediatricians, and percentage availability of Anesthetists in Community Health Centre. CHC is meant as the referral

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<sup>35</sup>Jeffrey (1988), *op. cit.*, p. 272.

centres of PHC which may refer cases of child and maternal morbidity to the CHC. CHC as laid down by IPHS is meant to provide specialist care in mentioned fields like gynecology, pediatrics, operation etc. Hence, it is a must to take these indicators to analyze the quality and inequalities of availability of healthcare facilities at community level.

### a. Regional Level

Between the hill and valley regions, the human resources had been consistently found to be more available in the latter than the former. The logical explanation behind this may be the unwillingness construed by low availability of basic amenities, lack of incentives<sup>36</sup>, harsh topography and inaccessibility to serve in hilly areas. Other reasons may be the political unwillingness to provide the required health personnel to the health facilities as per the norm. The same pattern had been found in the human resources available at CHC with an average composite index of 3.43 in valley region and 2.76 in hill region.

Table No. 3.16 Availability of human resources at CHC across regions.

Category	Hills	Valleys
High (5.37 and above) ( $\mu+1SD$ and above)	Meghalaya Hills, Sikkim Hilly region	Manipur valley region
Medium (2.75 to 5.37) ( $\mu$ to $\mu+1SD$ )	Mizoram Hilly region	Assam valley region
Low (0.13 to 2.75) ( $\mu-1SD$ to $\mu$ )	Nagaland Hilly region, Arunachal Pradesh Hilly region, Manipur hilly region	Tripura valley
Very Low (Below 0.13) (Below $\mu-1SD$ )	Assam hilly region, Tripura Hilly region	Nagaland valley

Source: Calculated from DLHS-4 (2012-13) State wise Report.

At state level, the state of Meghalaya which is mostly dominated by hill areas had been found to be the best in terms of availability of human resources with a CI of 7.13. Unfortunately,

<sup>36</sup>Jeffrey (1988), *op. cit.*, p. 264.

state with high population size like is Tripura (3,673,917 persons in 2011<sup>37</sup> which is the second largest population in Northeast) had least availability of human resources with a CI of 0.56. Sikkim (CI 5.76), Mizoram (CI 4.39), Manipur (CI 4.17) also had very high availability of specialists at CHC like Obstetricians/Gynecologist, Pediatricians and Anesthetists coming second, third and fourth respectively. While Arunachal Pradesh (CI 0.69) and Assam (CI 2.94) are other states which had the least human resources in the Northeastern region of India.

From Table No. 3.16, two regions namely the hilly region in Meghalaya (CI 7.13) and hilly region in Sikkim (CI 5.76) and valley regions of Manipur (CI 6.45) could be classified into high. Hilly regions of Meghalaya had low availability of Obstetricians/Gynecologists (8.33 per cent) and medium availability of Pediatrician (50 per cent). Hilly regions of Sikkim also had very low availability of pediatrician (0.75 per cent) along with for non-existence of facility in some regions of Sikkim. There should be at least a CHC in each district regardless of the population norms because without CHC, those patients which have been recommended specialist care to be given by CHC based on referral from PHC are left with no alternatives but to seek private treatment. Valley regions in Manipur also had very few facilities with low availability of Obstetricians/Gynaecologists (25 per cent), and Pediatricians (18 per cent) and Anesthetists (13 per cent) in the CHC facilities of the valley region.

Hilly regions in Mizoram (CI 4.39) and valley regions of Assam (CI 3.22) were categorized under medium category with CI value ranging from 2.75 to 5.37. Hilly region in Mizoram had poor availability of pediatricians (6.25 per cent) but comparatively better availability of anesthetists (18.75 per cent) as compared to others regions of Northeast India. Assam valley region had some facility of all the specialist doctors like gynaecologists (18 per cent), pediatricians (8 per cent) and anesthetist (5.28 per cent) in the region. In fact, in terms of distribution the region had more or less uniform availability of human resources across the regions.

Hilly regions of Manipur (CI 2.35), Nagaland (CI 1.94), Arunachal Pradesh (CI 0.69) and valley region in Tripura (CI 1.13) were grouped under low category of availability of human

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<sup>37</sup>Northeastern Council Secretariat.(2015). *Basic Statistics of Northeastern Region 2015*.Government of India.

resources at CHC. In the Manipur hilly region, there was low availability of anesthetist (20 per cent) and zero availability of Pediatricians, Obstetricians/Gynecologists in the entire hilly region. Hilly regions in Nagaland had poor availability of specialist doctors in the CHC with just 3 per cent availability of Obstetricians/Gynecologists and zero per cent availability pediatricians in the entire region. In Arunachal Pradesh hilly region all the three specialists were found to be in low percentage of 1.2 per cent Obstetricians/gynaecologists and 3.33 per cent availability of anesthetists. All these reflect the poor quality of the little existing CHC facility in the region.

Hilly regions in Tripura and Assam and valley region in Nagaland did not have any facility of gynecologist, pediatricians or anesthetists in the entire regions. This shows that the facility of CHC is very poor in the entire northeast region. There existed high inequality in availability of human resources at CHC in regional level as indicated by a CV of 64.49.

#### **b. District level**

The region wise performance can be studied in further details at the district level analysis. The various district of Northeast has been categorized into five categories i.e., very high, high, medium, low and very low based upon composite index value.

Two districts namely Aizawl (Mizoram) and South (Sikkim) districts were categorized under the very high category with composite index value of 23.58 and 23.03 respectively. Aizawl had facilities of specialists' doctors namely Gynecologist (50 per cent), Pediatricians (50 per cent) and Anesthetists (100 per cent) in CHC while South district had the facility of Obstetricians/Gynecologists and Anesthetists but there is no Pediatrician at the CHC.

South Garo Hills and Jaintia Hills of Meghalaya were grouped under high category of availability of human resources at CHC with CI value of 16.14 and 15.20 respectively. South Garo Hills and Jaintia Hills had high availability of pediatrician (100 per cent) but comparatively lower availability of Gynecologist /Obstetricians (less than 35 per cent).

As seen in table 3.17, six districts occupied medium category which includes Ukhrul (11.75 per cent) and Imphal East (CI 11.51) districts of Manipur, Peren (CI 11.75) of Nagaland and Kamrup (CI 9.28), Jorhat (CI 7.82), Tinsukia (CI 10.50) of Assam. Ukhrul had no facility of

specialists doctors like gynecologists or pediatrician but has good facility of anesthetist (100 per cent availability). But Imphal East has facility of gynecologists (50 per cent) and anesthetists only (50 per cent).

Table No. 3.17 Availability of human resources at CHC across districts.

Category	No. of districts
Very High (18.27 and above) ( $\mu+3SD$ and above)	2
High (13.13 to 18.27) ( $\mu+2SD$ to $\mu+3SD$ )	2
Medium (8.09 to 13.13) ( $\mu+1SD$ to $\mu+2SD$ )	6
Low (3 to 8.09) ( $\mu$ to $\mu+1SD$ )	16
Very Low (Below 3) (Below $\mu$ )	56

Source: Calculated from DLHS-4 (2012-13) State wise Report.

Sixteen districts occupied the low category consisting of Jorhat (CI 7.82), Nagaon (CI 6.74), and Barpeta (CI 4.46) etc. of Assam, Imphal west (CI 6.19) and Bishnupur (CI 5.64) etc. of Manipur, Phek (CI 3.92) and Mokokchung (CI 3.76) of Nagaland etc. Out of these districts Imphal West had 50 per cent availability of pediatrician while there was no availability of obstetrician or anesthetists. Thus, it is clear that even if the human resources are there, there is shortage or rather unavailability of one or two other specialists in a CHC. The reason behind shortage may be because of not filling the vacant posts and also the lack of facilities needed to support the healthcare services such as electricity, water supply, Operation theatre etc.

Majority of districts (56 in number) occupied the very low category of Northeast. Some of these districts were Bongaigon (CI 1.31), Dhemaji (CI 2.06), Dhubri (CI 2.15) etc of Assam, Thoubal (CI 2.48) of Manipur, West Tripura (CI 2.25) etc. These districts were better off than the rest of the districts falling in very low category. They had at least one specialist in the CHC. The rest of the districts like Tawang of Arunachal Pradesh, Senapati of Manipur, East Garo Hills of Meghalaya, Mamit of Mizoram, Mon of Nagaland, South Tripura of Tripura, Kokrajhar of Assam etc. had no specialists at all in the entire districts. Eventually, they have to refer to higher centres of healthcare for proper diagnosis and treatment. As such

the district level inequality availability of human resources at CHC is extremely high with a CV of 78.30.

The lack of human resources at Community health centre may be due to the low prestige associated with being posted at CHC compared to being posted at hospitals or engaging in private practices of their own.

#### **3.4.4 Patterns of availability of Human Resources at District Hospital**

District hospital is supposed to serve both the population of the districts as well as any outpatient from other areas in need of care. It is to be manned by so many staffs and doctors for efficient functioning of the hospitals. However, due to unavailability of facility data at unit level, indicator like percentage availability of pediatricians which was available in the DLHS-4 report was taken to represent the district human resources which may not be sufficient but nevertheless needed.

##### **a. Regional level**

The regional level analysis revealed once again that the valley regions have better human resources than the hill regions with CI of 2.35 and 1.82 respectively. Amongst the state, Sikkim had the best human resources in District Hospital with a CI of 3.74 followed by Assam (2.50), Tripura (2.10), Nagaland (1.70 CI). While the least facility was available in Manipur district hospital with a CI of 1.14, followed by Mizoram (CI 1.52), Arunachal Pradesh (CI 1.17). These states have further been divided into 12 sub-regions to give a more detailed analysis of the availability of human resources at the district hospital.

From the Table No. 3.18, it is seen that hilly region in Sikkim (CI 3.74), Meghalaya (CI 3.34) and valley region of Tripura (CI 4.21) had high availability of human resources like pediatrician and radiologist in the District Hospital (DH). Amongst these regions, hilly region in Meghalaya had the highest availability of pediatrician (83.33 per cent) and of radiologist (50 per cent) at district hospital.

Only one region occupied the medium category which was the valley region in Assam where pediatricians was available in high percentage (71.43 per cent) but low availability of radiographers.

Table No. 3.18 Availability of human resources at DH across regions.

Category	Hills	Valleys
High (3.29 and above) ( $\mu+1SD$ and above)	Sikkim Hills, Meghalaya Hills, Meghalaya hilly region	Tripura valley
Medium (2.02 to 3.29) ( $\mu$ to $\mu+1SD$ )	NA	Assam valley
Low (0.75 to 2.02) ( $\mu-1SD$ to $\mu$ )	Nagaland hilly region, Assam Hilly region, Manipur hilly region, Arunachal Pradesh hilly region	Nagaland valley region
Very Low (Below 0.75) (Below $\mu-1SD$ )	Tripura hilly region	Manipur valley

Source: Calculated from DLHS-4 (2012-13) State wise Report. NA – Not Applicable

Majority of the regions occupied the low category such as the hilly region in Nagaland (CI 1.86), Assam (CI 1.86), Arunachal Pradesh (CI 1.17) and Manipur (CI 1.68) and the valley region in Nagaland (CI 1.86). Manipur hilly region had 33.33 per cent availability of pediatrician and 11.11 per cent availability of radiologists. The rest of the region also had huge shortage of human resources at the district hospital. Only two regions occupied the very low category which was the hilly region in Tripura (zero per cent shortage of pediatrician and radiographer) and valley region in Manipur (40 per cent and 20 per cent availability of pediatrician and radiographer respectively). There is high inequality of availability of human resources at District hospital as indicated by CV of 52.27 in the region.

#### **b. District level**

The districts which were categorized into the high category include Papum Pare (CI 6.55), Lower Subansiri (CI 4.69) of Arunachal Pradesh, Ri Bhoi (CI 6.55) of Meghalaya, Aizawl (CI 6.55), Kohima (CI 6.55) and Phek (CI 6.55) of Mizoram, Marigaon (CI 4.69) and Sibsagar (CI 4.69) of Assam and Churachandpur (CI 6.55) of Manipur. Amongst these Papum pare, East Garo Hills, Kohima, Phek had 100 per cent availability of both pediatrician



and Radiographer. The rest of the districts had the availability of either pediatrician or radiographer in DH. Only one district namely Nalbari of Assam occupied the medium category which had 50 per cent availability of pediatrician and radiographer in the DH.

Maximum number of districts (64 in number) occupied the low category namely East Kameng (CI 1.86) and Upper Subansiri (CI 1.86) of Arunachal Pradesh, Thoubal (CI 1.86), Ukhrlul (CI 1.86) South Garo Hills (CI 1.86) etc. of Meghalaya, Lunglei (CI 1.86) of Mizoram, South Tripura (CI 1.86) of Tripura, Dhubri (CI 1.86), Karbi Anglong (CI 1.86), North Cachar Hills (CI 1.86) etc. of Assam. These districts had 100 per cent availability of pediatrician while there was zero per cent availability of radiographer. Clearly skilled personnel are in shortage in almost every district hospital of Northeast.

Table No. 3.19 Availability of human resources at DH across districts

Category	No. of districts
High (4.36 and above) ( $\mu+1SD$ and above)	17
Medium (2 to 4.36)( $\mu$ to $\mu+1SD$ )	1
Low (Below 2) (Below $\mu$ )	64

Source: Calculated from DLHS-4 (2012-13) State wise Report. NA – Not Applicable

There are some more district which have zero per cent availability of pediatrician and radiographer in the respective district hospital and some of the important districts which can be mentioned are Tawang, West Kameng, West Siang, Upper Siang, Dibang Valley, Tirap, Changlang etc. in Arunachal Pradesh, Senapati, Tamenglong, Bishnupur, Imphal East, Imphal West etc. of Manipur, West Garo Hills and West Khasi hills of Meghalaya, Mamit, Kolasib, Champhai and Saiha of Mizoram, Mon, Tuensang, Mokokchung etc. of Nagaland, Dhalai and North Tripura of Tripura, Barpeta, Dibrugarh, Hailakandi of Assam.

All the districts of Arunachal Pradesh had one facility of district hospital in each district, therefore it must have at least one pediatrician and radiographer. As the above analysis showed that some district had zero per cent availability of pediatrician and radiographer. It points to the possibility of inaccessibility or lack of trained personnel influencing the availability of human resources in the sub-regions.

Coming to Manipur, the hill districts had facility of District hospital which was not there in the capital district. The possible explanation may be that since Imphal has lots of private hospitals and government hospitals, the maintenance of district hospital may lead to wastage of resources. The same reason may be applied for the plain regions of Assam which has better facility in better hospitals and connectivity and hence people prefer the former than the district hospitals. As for Mizoram and Meghalaya, inaccessibility and lack of trained doctors might have contributed to shortage of personnel in the districts.

There was huge inequality in the availability of human resources in the district hospitals of the Northeastern region as the CV of 117.94 reveals. This reveals that at a district level, inter play of various factors exist which have to be addressed properly to fill up the inter-district inequality in availability. The same pattern of inequality was found in state level CV with Manipur having the highest inequality (CV 198.43) followed by Arunachal Pradesh (CV 166.53) and Mizoram (CV 169.03).

The valley regions had better human resources than the hilly region in all the health facilities. Sikkim hilly region had the best human resources available in sub-centre while Dibang Valley has the lowest. In PHC Manipur valley had the highest human resources availability while Arunachal Pradesh hilly region the lowest. In CHC, Meghalaya hilly region had the highest human resources available while Nagaland, Assam and Tripura hilly region had the lowest. In case of District hospital, Tripura valley region has the highest and Tripura hilly region the lowest human resources available. East district of Sikkim had the highest human resources in SC, Imphal West the highest and Dibang Valley the lowest human resources in PHC. Aizawl has the highest human resources available and most of the districts of northeast have no facility of human resources at all. In terms of district hospital, Papum pare had the highest and East Kameng, Upper Subansiri, Lohit etc. the lowest.

### 3.5 Total availability of Physical healthcare services

#### a. Regional level

In the composite index of physical infrastructure, the hilly region fared better than the valley region with a CI score of 19.86 and 13.24 respectively. While amongst the state Mizoram had the best physical infrastructure with a CI of 26.85 followed by Arunachal Pradesh (CI 22.06) and Sikkim (CI 21.48) whereas Manipur (CI 10.72) had the worst physical infrastructure in place followed by Tripura with a CI value of 12.48. Within these states, if the regions are compared, it is known that the hilly regions in Mizoram (CI 26.85), Sikkim region (CI 21.48), Arunachal Pradesh (CI 22.06) fall in the high category of physical infrastructure with CI ranging from 21.76 - 27.08.

Hilly region in Mizoram had high availability of facilities at SC (CI 5.68 calculated for region wise at SC only) and PHC (CI 5.28 calculated for region wise at PHC only). The hills and valley regions of Nagaland occupied the medium category with CI value ranging from 16.44 - 21.76 (table 3.20).

Table No. 3.20 Composite index of total physical healthcare services across regions.

Category	Hilly region	Valley region
High (21.76 to 27.08)( $\mu+1SD$ to $\mu+2SD$ )	Mizoram hills, Arunachal Pradesh Hills, Sikkim hills	NA
Medium (16.44-21.76) ( $\mu-\mu+1SD$ )	Nagaland hills	Nagaland valley
Low (11.12 to 16.44) ( $\mu-1SD$ to $\mu$ )	Meghalaya hills, Assam hills, Manipur hills,	Tripura hills
Very Low (5.8 to 11.12)( $\mu-2SD$ to $\mu-1SD$ )	Manipur valley	NA

Source: Calculated from DLHS-4 (2012-13) States wise Report. NA – Not Applicable

The hilly region had high availability of facility at SC (CI 4.18) and PHC (CI 4.07) while it is comparatively lower at CHC (CI 3.36). The valley region of Nagaland also had high availability of facility at SC (CI 4.27) and CHC (CI 5.93) but low facility at DH (CI 0.63).

Four regions were grouped into low category which included the hill regions in Meghalaya Assam, Tripura and Manipur and valley regions in Assam and Tripura which had low availability of facilities at SC and PHC. Hilly regions in Meghalaya had low availability of facilities at CHC (CI 2.54) and DH (CI 0.50) while that of Assam had low facility at SC (CI 2.37) and DH (CI 0.63). Tripura valley region had low facility at CHC (CI 1.22) and DH (CI 1.01).

Manipur valley region was categorized in the very low category whose overall physical infrastructure in terms of average person covered, facilities at SC, PHC, CHC and DH was quite low. Also, the regional level inequality in availability of total physical healthcare services is medium with a CV of 32.38(refer to Annexure Table No.1).

### **b. District level**

Coming down to the district level will help to validate the regional level ranking obtained above. Serchhip (CI 42.55) and Aizawl (CI 32.47) of Mizoram were categorized in the highest category in both within the regional and state level. Mizoram had the highest overall availability of physical healthcare services. Also, Dibang Valley of Arunachal Pradesh came under this category. These districts had a CI score of above 30.66 and had high physical healthcare in SC, PHC, CHC and DH except for the district of Dibang Valley which had low healthcare facilities but the low average person covered per health facilities has pulled up its composite index value.

Ten districts were grouped under the high category which included Champhai (CI 28.98) of Mizoram, Upper Siang (CI 28.56) of Arunachal Pradesh, South (CI 25.61) of Sikkim etc. The composite index value of these districts ranged from 24.13 to 30.66. Champhai had high availability of physical healthcare facilities (CI 28.29) but low availability of human resources (CI 9.92). The high availability of physical healthcare facility may be due overall good healthcare facility in place in SC (CI 7.59), PHC (CI 6.62), and CHC (CI 5.93). Upper Siang is the complete opposite of Champhai as it has very low coverage of persons per SC, PHC and CHC along with low healthcare facilities at CHC and DH. Meanwhile, South district of Sikkim had low facilities at CHC (CI 1.39) and DH (CI 1.26).

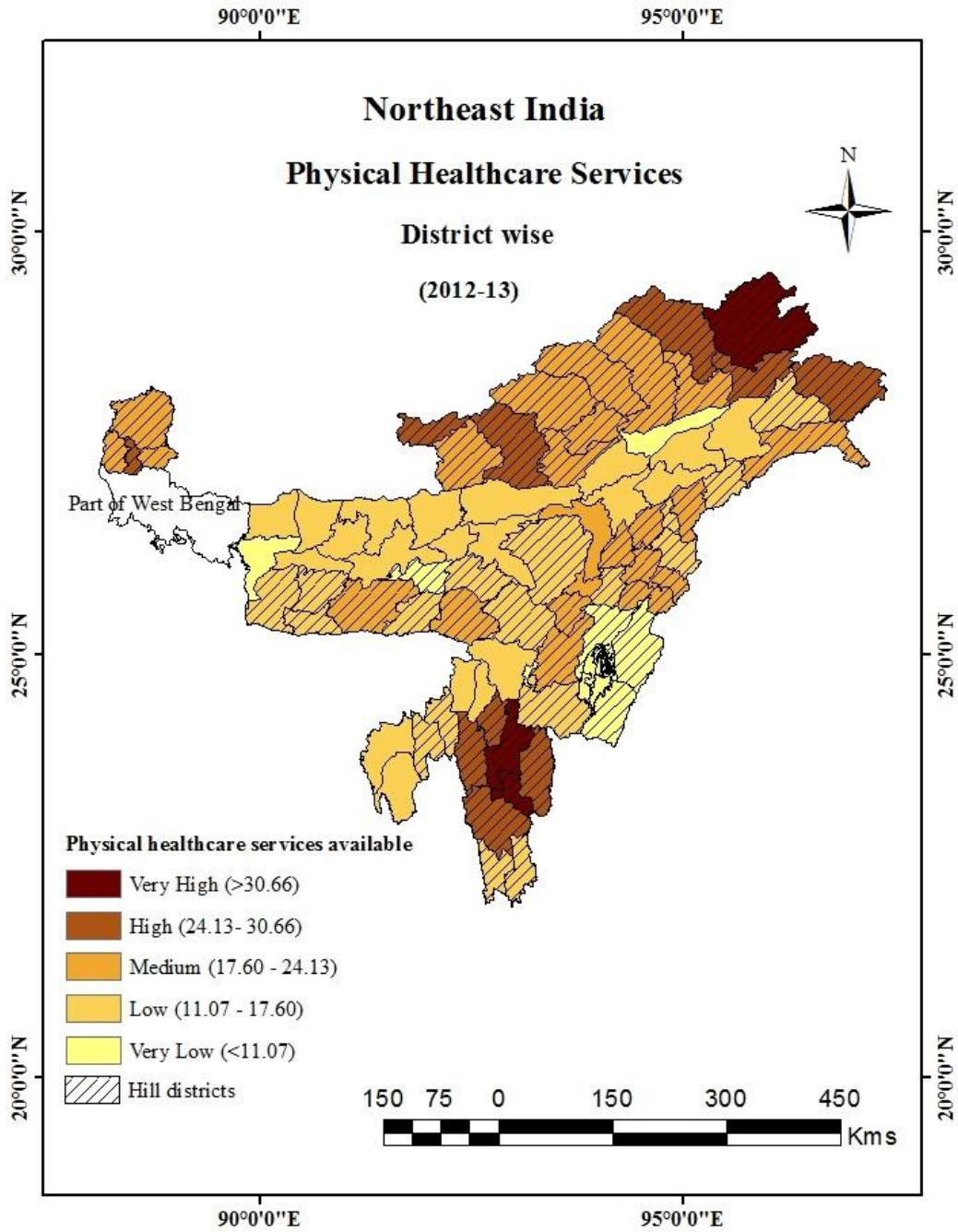
There were 24 districts grouped into medium category with CI value ranging from 17.60 - 24.13. Some of the districts were Mokokchung (CI 23.04) of Nagaland, Kurung Kumey (CI 22.25) of Arunachal Pradesh, North (CI 21.26) of Sikkim, Tamenglong (CI 20.95) of Manipur etc. Mokokchung had high facility in terms of physical healthcare facilities (CI 23.04) but low human resources (CI 7.87).

Maximum numbers (36 in number) of districts were categorized into the low category. Some of the districts were Hailakandi (CI 11.12) of Assam, North Tripura (CI 11.17) of Tripura, East Garo Hill district of Meghalaya, Lohit (CI 16.27) and Tirap (CI 13.18) of Arunachal Pradesh etc. The CI value of these districts ranges from 11.07-17.60. Overall physical healthcare facilities were low in Hailakandi with high population coverage per SC (5716), PHC (36329) and CHC (134689) exceeding the norms laid down by IPHS (2007) for population coverage. Moreover, there was zero per cent availability of labour room, regular electricity supply at SC, zero availability of OT at CHC. Despite being located in the valley region of Assam, there is still huge shortage of infrastructure at the SC, PHC and CHC facilities. This implies that geographical factor is not the only reason determining the availability of healthcare facilities. It may be due to other reason like political factor.

Eight districts were categorized in the very low category which includes Chandel (CI 5.98), Ukhrul (CI 7.70), Bishnupur (CI 8.29) etc of Manipur (Map 3.3). The composite index values of these districts were less than 11.07 and had low facilities in all the concerned healthcare centres.

Chandel had very poor availability of healthcare facilities with zero per cent availability of CHC facility, zero per cent regular electricity supply at SC and PHC etc. This might be because of the inaccessibility of the region as the district is a part of the hilly regions of Manipur.

The level of inequality in the district was found to be in medium range with a CV of 37.09. At state level, half of the states had medium level of inequality like Sikkim (CV 19.69), Manipur (CV 27.05), Meghalaya (CV 29.61) (refer to Annexure Table No.1) etc. The hilly region had the best physical healthcare facilities of which Mizoram hilly region had the highest and Manipur valley the least. At district level, Serchhip has the highest and Hailakandi and Chandel the least physical healthcare services.



Map 3.3 Total Availability of Physical Healthcare Services across districts in Northeast India, 2012-13.

### 3.6 Total availability of Human Resources

The composite index of human resources available indicates that the valley region had better health facilities than the hilly region. These diabolic distributions of human resources may be because of better hospitality and opportunity available in valley regions as compared to the hilly region of North east.

#### a. Regional level

The state level CI value revealed that Sikkim has the highest human resources available with a CI of 15.24 followed by Meghalaya (CI value of 14.68). Arunachal Pradesh (CI, 5.04) and Nagaland (CI, 6.71) have the lowest human resources.

In the regional level analysis the regions of Sikkim (CI 15.24), Meghalaya (CI 14.68) and Manipur valley (CI 13.36) had the highest availability of human resources (table 3.21). Sikkim had high availability of human resources at sub-centres with a CI 3.30 which was the highest amongst all the regions. While hilly region in Meghalaya (CI 2.80) had lesser availability of human resources at primary health centre as compared to hilly region of Sikkim. These are followed by the regions of Tripura valley (CI 11.52), Assam valley (CI 10.40) and Mizoram hills (CI 10.25) in the medium category. These regions had high availability of human resources at sub-centres with CI values above the 2.40 average for in all the regions.

Table No. 3.21 Category of availability of human resources across regions.

Category	Hilly region	Valley region
High (13.19 to 16.94) ( $\mu+1SD$ to $\mu+2SD$ )	Sikkim hills, Meghalaya hills	Manipur valley
Medium (9.44 to 13.19) ( $\mu$ to $\mu+1SD$ )	Mizoram hills	Tripura valley, Assam valley
Low (5.69 to 9.44) ( $\mu-1SD$ to $\mu$ )	Manipur hills, Assam hills, Nagaland hills	Nagaland valley
Very Low (1.94 to 5.69) ( $\mu-2SD$ to $\mu-1SD$ )	Arunachal Pradesh hills, Tripura hills	NA

Source: Calculated from DLHS-4 (2012-13) States wise Report. NA – Not Applicable

Hilly regions in Manipur (CI 13.39) and Assam (CI 7.72) and Nagaland (CI 7.25) and valley region in Nagaland (6.65) were grouped in the low category. Most of them had CI less than the average value of 9.57. Manipur hilly region had lesser availability of human resources at sub-centre with CI value of 1.98 which was below the average score of 2.40. It also had very poor facilities at CHC (with CI of 2.35 which was less than the average value of CI 2.75) and at DH with CI value of just 1.68 which is below the average score of 2.02. Assam hilly region has no facility of human resource at CHC.

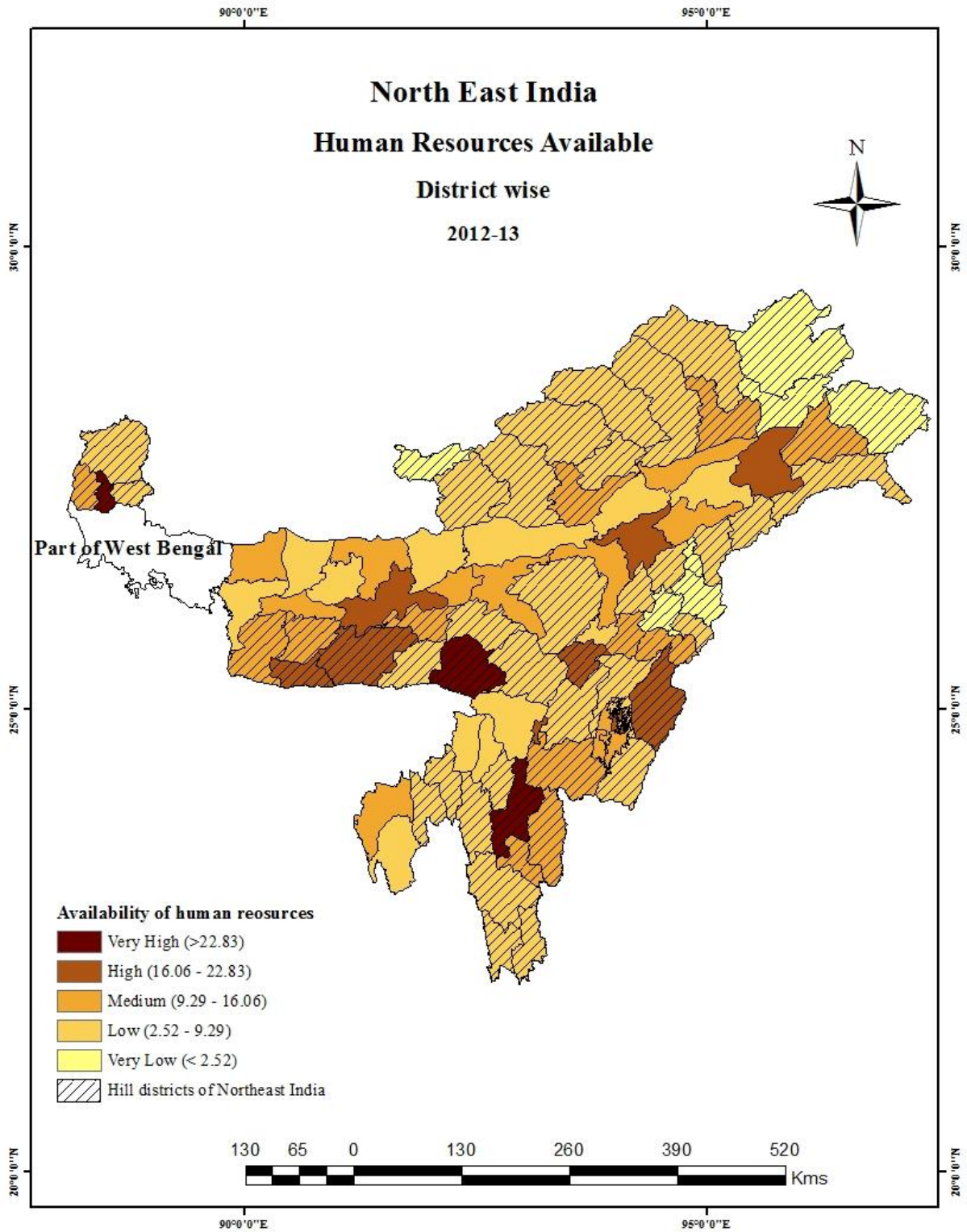
Hilly regions in Arunachal Pradesh (CI 5.04) and Tripura (CI 4.43) had the lowest category in human resources available in the Northeast with CI value below the average score of 9.29. Both the regions had very low facility of human resources at CHC with zero per cent availability of facilities and DH with below average score of 2.02. The inequality in total availability of human resources was medium with a CV of 37.75.

#### **b. District level**

At district level only three districts were grouped under the very high category such as Aizawl, South and Jaintia Hills which is shown in the Figure 3.4. These districts had a composite score above 22.83 since they had very high facility of human resources at CHC and DH. In fact, Aizawl had the highest human resources at CHC with a CI value of 23.58 which was far better than the average value of three.

There were six districts lying in the high category such as South Garo Hills and West Khasi Hills of Meghalaya, Tinsukia and Jorhat of Assam, Ukhrol and Imphal East of Manipur which had CI value above the average score of 9.29 (as shown in Map 3.4). South Garo hills had high facilities of human resources in CHC with CI value of 16.14 which was higher than the average score of three. While in the districts of Assam the facilities of human resource were high for example Jorhat had high CI value of 3.51 in SC which was above the average score of 3.32. In Manipur, Imphal East had high human resources at SC with composite score of 2.48 but low facility at DH with zero per cent availability of human resources. Imphal East had better access to government hospitals but Ukhrol being a hilly region did not have any facility of district hospital.





Map 3.4 Total Availability of Human Resources across districts in Northeast India, 2012-13.

The districts of West Tripura, East Siang, Imphal West, Goalghat, Champhai etc. were grouped in medium category. The value of CI in this category ranged from 9.29 to 16.06. These districts had high facility of human resources at SC with CI score of 2.31 to 2.74. Out of these districts Champhai (CI 1.59) and Goalghat (CI 1.73) had low facility at PHC with CI score below the average score of 4.2.

Majority of the districts (40 in number) with CI value of 2.52 to 9.29 were grouped in low category. Some of the districts were North Cachar Hills, Karbi Anglong, Barpeta etc. of Assam, East and North of Sikkim, Lower Subansiri, Upper Subansiri, Changlang etc. of Arunachal Pradesh, Kolasib, Saiha, Mamit etc. of Mizoram, Mon of Nagaland etc. These districts of Assam, Sikkim and Arunachal Pradesh had no facility of human resources at CHC making them to be in the lower rung of the ladder.

Dibang Valley, Tawang, Lower Dibang Valley districts etc. of Arunachal Pradesh and Zunheboto and Kiphire of Nagaland occupied the very low category of availability of human resources. These districts had zero per cent availability of human resource at CHC and DH and very low facilities at SC with composite index value below average score of 3.32 and 4.2 at PHC.

Summing up, Sikkim hilly region had the best human resources and Arunachal Pradesh the least. At district level, Aizawl had the best human resources and Dibang Valley the least. There was high inequality in availability of human resources at district level with a CV of 72.93. This high level of inequality existed at state level too with most of the states having high inequality such Tripura (CV69.38) and Nagaland (CV 63.96).

### **3.7 Total availability of healthcare services**

#### **a. Regional level**

In the total availability of healthcare services, the hill region had better healthcare services than the valley region with a CI of 28.37 and 24.04 respectively. This is because hilly states

like Sikkim, Mizoram, and Meghalaya are well developed and had high facility of healthcare services than the valley region.

Coming to states Mizoram (CI 37.10), Sikkim (CI 36.72), and Meghalaya (CI 30.91) had the best healthcare services while Manipur and Tripura had poor healthcare facilities in the region which is highlighted in the Table No. no. 3.22. Within these states, the sub-regions can be compared and Mizoram and Sikkim hills had the highest availability of healthcare services with a CI of 37.10 and 36.72 respectively. While hill regions of Meghalaya, Arunachal Pradesh and Nagaland were grouped in the medium category of availability of healthcare services.

Table No. 3.22 Category of availability of total healthcare services across regions.

Category	Hills	Valleys
High (32.42 to 38.83) ( $\mu+1SD$ to $\mu+2SD$ )	Sikkim Hills, Mizoram hilly region	NA
Medium (26.01 to 32.42) ( $\mu+1SD$ to $\mu$ )	Nagaland hilly region, Meghalaya Hills, Arunachal Pradesh hilly region	NA
Low (19.6 to 26.01) ( $\mu-1SD$ to $\mu$ )	Assam Hilly region, Manipur hilly region	Nagaland valley region, Manipur valley, Assam valley, Tripura valley
Very Low (13.19 to 19.6) ( $\mu-2SD$ to $\mu-1SD$ )	Tripura hilly region	NA

Source: Calculated from DLHS-4 (2012-13) States wise Report. NA – Not Applicable

Maximum numbers of regions were grouped in low category such as Nagaland valley, Tripura valley, Assam valley, Manipur hills and Assam Hilly regions. Regions like the hilly regions in Tripura were grouped in very low category. In terms of total healthcare facilities available the inequality was low with a CV of 26.01(refer to Annexure Table No.1). This shows that there is low inequality in terms of availability of total healthcare facilities between

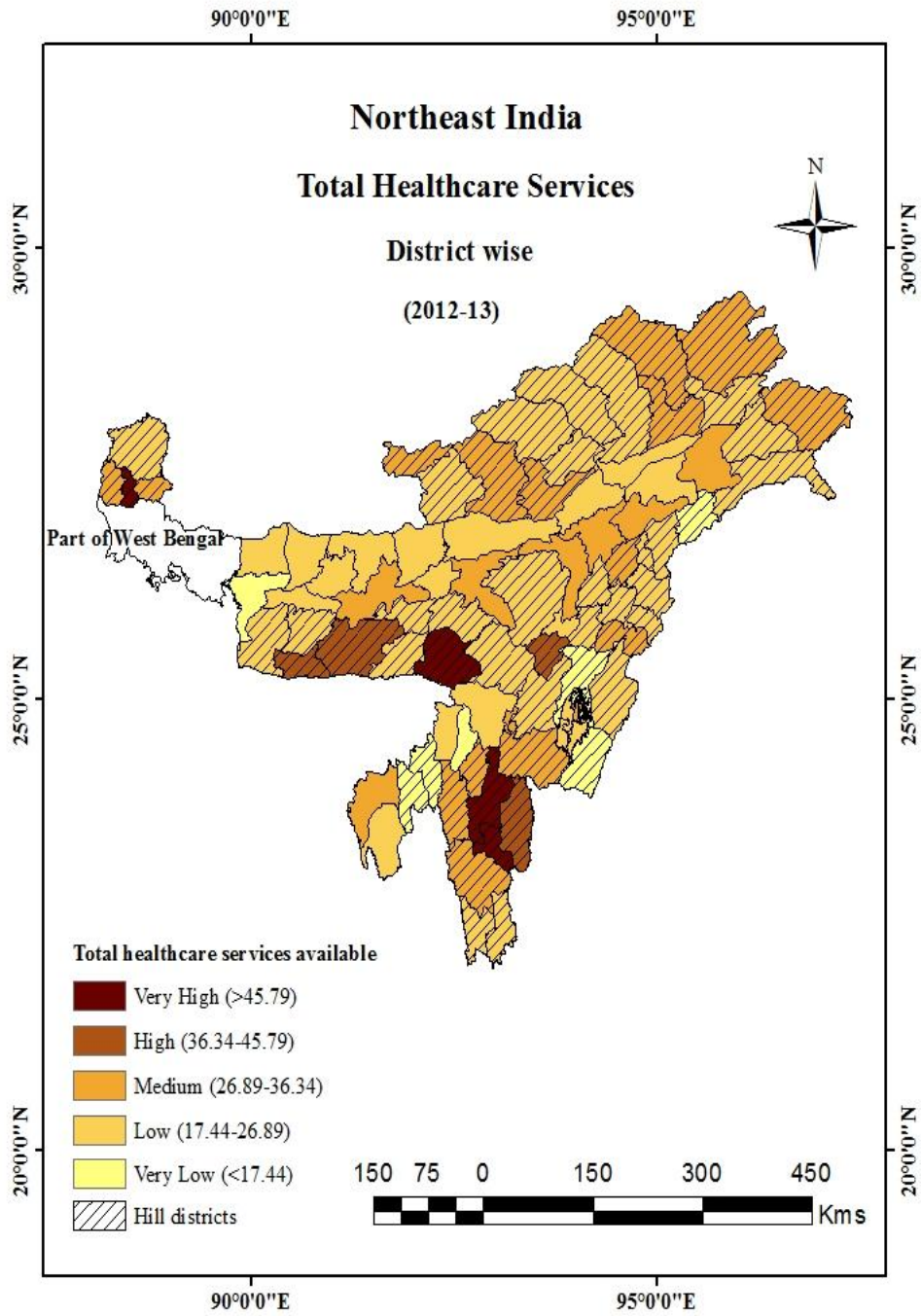
the various regions in Northeast. Geographical factors seems to be not so relevant in the availability of healthcare facilities calling for deeper level analysis at district level to find out the inter district distribution and inequality.

#### **b. District level**

Amongst the districts, four districts occupied the very high category which included Aizawl (CI 68.43) and Serchhip (CI 55.39) South of Sikkim (CI 60.84) and Jaintia Hills of Meghalaya (CI 46.28) which is shown in Map 3.5. These districts had very high availability of both physical and human healthcare services. Champhai (CI 38.90) of Mizoram, West Khasi Hills (CI 38.50) and South Garo Hills (CI 14.70) of Meghalaya, Phek (CI 36.76) and Peren (CI 37.22) of Nagaland and Jorhat were grouped under high category with CI ranging 35-38 only. These districts had comparatively lower availability of human resources as compared to the physical healthcare services available except for South Garo Hills which had better human resources (CI 22.80) facility than the physical (CI 14.70) (refer to Annexure Table no.4).

Districts of East Siang (CI 35.40), Dibang Valley (CI 32.40), West Tripura (CI 30.20), Nagaon (CI 29.90) etc. altogether 22 districts came in medium category. The CI value of these districts ranged from 26.89 to 36.34. Dibang Valley of Arunachal Pradesh had lower availability of human resources (CI 0.38) in the entire districts than the physical healthcare facilities (CI 32.02) that are present. West Tripura had almost equal availability of both human (CI 15.63) and physical healthcare (CI 14.57) facilities.

Maximum numbers of districts (43) were grouped in the low category which had CI value of 17.44 to 26.89. Some of the districts include Longleng (CI 17.83) of Nagaland, Bongaigon (CI 18.64) of Assam, Lohit (CI 26.57), Lower Subansiri (CI 26.48), Kurung Kumey (CI 25.31) etc. of Arunachal Pradesh, and North (CI 26.27) of Sikkim, Thoubal (CI 19.54), Imphal West (CI 22.53) of Manipur, Wokha (CI 23.50). Among these districts Longleng had very low availability of human resources with a CI of 2.35 as compared to the physical health facilities which has a CI of 15.47.



Map 3.5 Total Healthcare Services across districts in Northeast India, 2012-13.

There were seven districts lying in very low category which include Chandel (CI 10.79) and Senapati (CI 14.53) districts of Manipur, Hailakandi (CI 14.19) and Dhubri (CI 17.33) of Assam. Amongst these districts Chandel had low availability of both human (CI 4.81) and physical healthcare (CI 5.98) facilities which was slightly better in Hailakandi (CI 11.12 for physical healthcare facilities CI 3.02) and Senapati (CI 10.09 for physical healthcare facilities). As for human resources both the Senapati and Hailakandi had poor human resources.

The level of inequality at district level was a bit higher than the regional level with a CV of 35.12. There seems to be high of inequality in terms of total healthcare facilities available in all the states as reflected by the CV of each state with Arunachal Pradesh had the highest CV of 68.68, Mizoram having a CV of 60.58 and Tripura with a CV of 54.86. Other states like Manipur (CV 25.26), Sikkim (CV 31.82) and Mizoram (CV 24.62) had lower level of inequality than Tripura and Arunachal Pradesh.

### **3.8 Patterns of Accessibility of Healthcare Facilities**

Accessibility has been studied from the dimensions of distance, income inequality, social groups etc. Physical accessibility of healthcare is a problem in rural areas especially in rugged topography of Northeast making construction of connectivity and maintenance very costly due to physio-climatic condition. A study found that in India “only 37 per cent of people were able to access IPD facilities within a 5km distance, and only 68 per cent were able to access the OPD in rural areas. This is strikingly different from urban areas where 73 per cent and 92 per cent of people have access to IPD and OPD respectively”<sup>38</sup>. Also, the travel distance to healthcare facilities is more in rural areas than urban areas which were 63 per cent and 27 per cent respectively. This increase travel distance in rural areas directly impacts the productive capacity of the people in rural areas.

Accessibility of healthcare facilities has been calculated using the distance criteria given by IPHS (2007) for a Sub-centre, Primary Health Centre and Community Health Centre. A sub-

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<sup>38</sup>IMS Institute for Healthcare Informatics (2013). *Understanding Healthcare Access in India. What is the current state?* (pp. 11-17). New Delhi:IMS Institute for Healthcare Informatics.

centre must be located within 3kms from villages, PHC within 10 Kms from villages. Meanwhile, there is no such norm for CHC health centre. But 20 Kms has been taken as the accessibility criteria for villages as the hilly terrain itself poses constraints to the distance factor.

### 3.8.1 Sub-centres

#### a.Regional level

In the regional level, valley regions had better accessibility of sub-centres than the hill regions as indicated by the average score of 60.43 per cent in valley and 36.95 per cent in hill regions. Clearly, the topography influences the accessibility of sub centres in the villages of Northeastern region. While amongst the state Meghalaya (61.50 per cent) had the highest accessibility followed by Sikkim (51.77 per cent) and Manipur (49.53 per cent). While Arunachal Pradesh was the least accessible state in terms of sub-centre within 3 Kms (Refer to Annexure Table no.2).

Table No. 3.23 Category of accessibility of Sub-Centres in villages across regions.

Category	Hill regions	Valley regions
Very High (75.5 to 91.73) ( $\mu+2SD$ to $\mu+3SD$ )	Meghalaya hills	NA
High (59.27 to 75.5) ( $\mu+1SD$ to $\mu+2SD$ )	NA	Manipur valley
Medium (43.04 to 59.27) ( $\mu$ to $\mu+1SD$ )	Sikkim hills, Mizoram hills	NA
Low (26.81 to 43.04) ( $\mu-1SD$ to $\mu$ )	Nagaland hills, Tripura hills, Manipur hills	Nagaland valley, Tripura valley
Very Low (10.58 to 26.81) ( $\mu-2SD$ to $\mu-1SD$ )	Arunachal Pradesh Hills	NA

Source: Calculated from DLHS-4 (2013-14) Unit level data.NA – Not Applicable

Within the sub-regions, the valley region in Manipur had the highest accessibility (76.29 per cent) followed by Meghalaya hilly region (61.50 per cent) which was grouped in very high

and high category respectively (as seen in table 3.23). Sikkim and Mizoram were grouped into the medium category. Hill regions of Nagaland, Tripura, and Manipur etc. occupied the low category. The hill region of Arunachal Pradesh occupied the very low category (24.49 per cent) which had the least accessibility amongst the region. Region wise disparity is high with a CV of 43.04 which was also reflected in state wise CV. In the state wise CV of five out of eight states had high inequality among which Tripura (CV 94.76) had the highest inequality and Meghalaya had the least inequality (with a CV of 13.40).

#### **b. District level**

The average of all districts with villages that had Sub-centres within 3 kms is 39.74 per cent with 31 districts had more than the average percentage. The districts have been grouped into four categories with 13 districts in the high category, 28 in medium category, 7 in low category and 11 in very low category which is highlighted in Map 3.6. Bishnupur (83.33 per cent) and Aizawl (83.33 per cent) were grouped in the very high category of accessibility of sub-centres within 3 Kms from the villages. Bishnupur lies in the plain area of Manipur valley and hence be more conducive to the construction of Sub-centres in the area. While Aizawl being the capital city of Mizoram might have the amenities needed to support the facilities of Sub-centres.

The rest of the districts in the high category include Thoubal (81.82 per cent), South Tripura (75 per cent), Imphal East (73.33 per cent) etc. which were grouped in the high category. Districts like East Khasi Hills (72.73 per cent) and East Garo Hills (69.23 per cent) of Meghalaya, Zunheboto (66.67 per cent), and Papum Pare (63.64 per cent) were also grouped under the high category.

Districts lying in the medium category includes North district of Sikkim, Churachandpur of Manipur and Serchhip of Mizoram with the highest accessibility. Lohit (28.57 per cent), East Kameng (28.57 per cent), Mon (33.33 per cent) etc. have the lowest accessibility in the medium category.

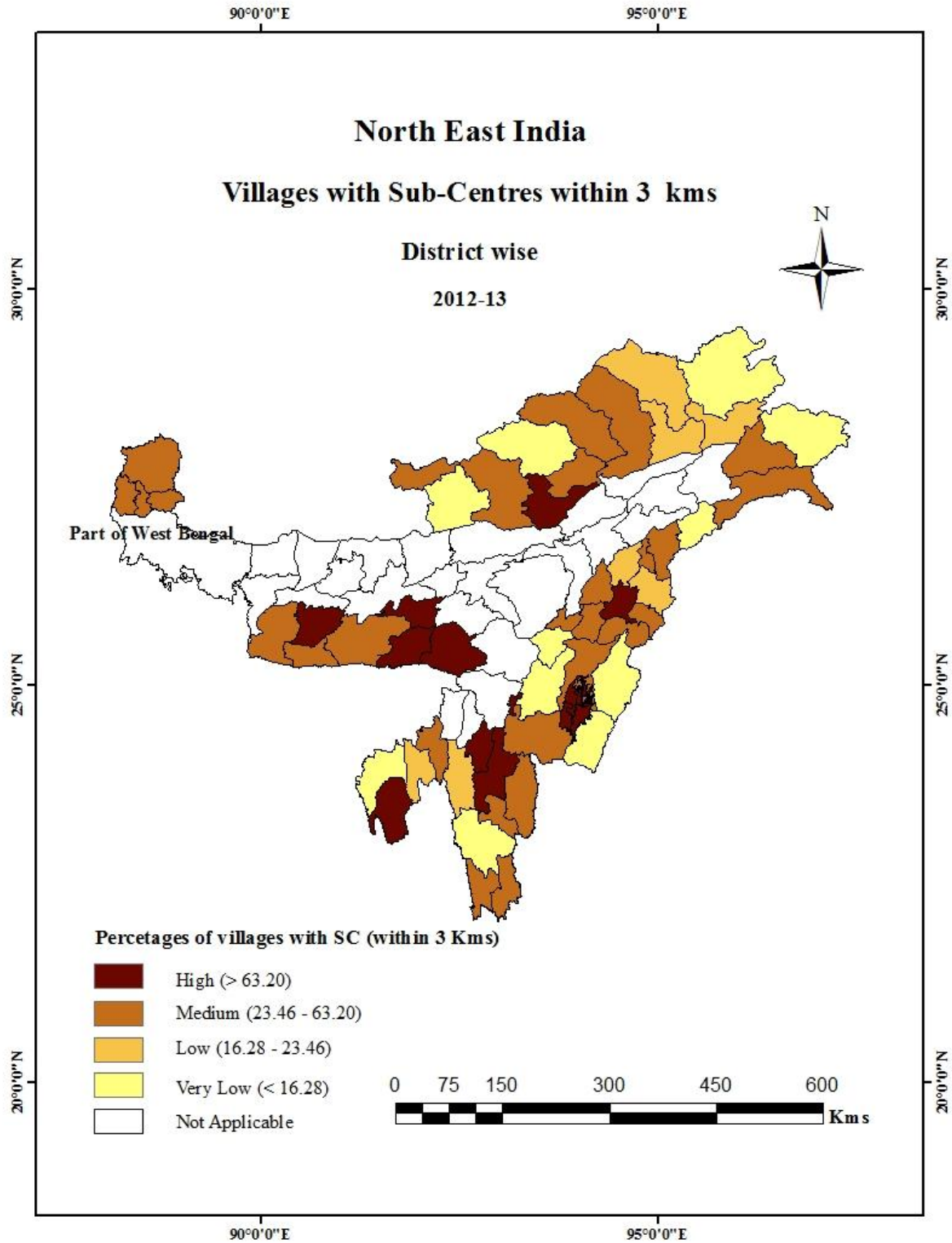
Districts like Mamit (18.18 per cent) of Mizoram, Lower Dibang Valley (20 per cent) of Arunachal Pradesh and Mokokchung (23.08 per cent) of Nagaland occupied the low



category. While districts like Chandel (15.38 per cent), Lunglei (8.33 per cent) and Anjaw (5 per cent) etc occupied the very low category.

The least accessible districts are demarcated based on accessibility of 4 - 10 kms and 10 and above kms. In the 4-10 kms category, West Tripura (100 per cent) and Dhalai (80 per cent) have the highest percentage. West Tripura did not have any villages with sub-centres within 3 Kms which made it the least accessible within 3 Kms (refer to Annexure Table no. 3). Dhalai also was categorized in the same category with 80 per cent villages lying within distance of 4-10 Kms but very low villages' percentages of villages that were accessible within 3 Kms from the villages. Kolasib district had high accessibility of sub-centres with most villages lying within 3 kms and least percentage of villages within the 4-10 kms category. In the least accessible category of villages with SC above 10 Kms Tamenglong (77.78 per cent) had the highest percentage indicating that it is the least accessible which is explained by its rough terrain and topography along with poor connectivity within the district. Dibang Valley also had the least accessibility with 66.67 per cent villages which had accessibility beyond 10 km and no villages with accessibility within 3 Kms.

The CV of 59.04 revealed that there was high inequality in accessibility of villages with sub-centres within 3kms. There was also high inequality in accessibility to SC with states like Arunachal Pradesh (CV 64.71) and Manipur which had high inequality (with a CV of 62.05 Refer to Annexure Table no.2). In fact, most the villages in the region as a whole were sub-centres located beyond 3 Kms. Since Sub-centre acts as the first contact point between the patients and healthcare services, location matters a lot especially to the women. This will ensure easy accessibility to sub-centres. Easy accessibility is important as many a times patients prefer to remain without visiting healthcares due to distance factors as well as the activities they have to do in home.



Map 3.6 Villages with Sub-Centres within 3 Kms across districts in Northeast India, 2012-13

### 3.8.2 Primary Health Centres

#### a. Regional level

The PHCs of the valley regions were more accessible than the hilly regions as the former had average percentage of 78.82 while the latter had a mere 44.27 per cent. One possible explanation behind this is that the valley region is made up of capital cities of the respective states having well developed road connectivity and amenities needed to support the PHC facilities.

But at the state level or sub-regional level, Tripura valley had the best accessibility with 71.83 per cent of villages having accessibility to PHC within 10 Kms. The state itself was dominated by plain areas with some hillocks in the North Tripura and Dhalai districts showing that continuous plain areas possess advantages in terms of development of health infrastructure. The state of Manipur also had very high accessibility with 68.68 per cent of the villages having accessibility. This would reflect the performance of the valley regions while the hill regions need to be looked into for assessing the full details of accessibility in the state. While the hilly states of Mizoram (21.82 per cent), Meghalaya (40.49 per cent) and Arunachal Pradesh (45.12 per cent) had the least accessibility. These states have further been divided into 10 sub-regions of hills and valleys (Table No. 2.24) and are analyzed further as follows:

Table No. 3.24 Category of accessibility of PHC within 10 Kms across regions.

Category	Hilly region	Valley region
Very High ( $\mu+1SD$ to $\mu+2SD$ ) (77.89 to 98.35)	NA	Manipur valley, Tripura valley
High ( $\mu$ to $\mu+1SD$ ) (57.43 to 77.89)	Tripura hills, Sikkim hills	Nagaland valley
Medium ( $\mu-1SD$ to $\mu$ ) (36.97 to 57.43)	Manipur hills, Nagaland hills, Arunachal Pradesh Hills, Meghalaya hills	NA
Low ( $\mu-2SD$ to $\mu-1SD$ ) (16.51 to 36.97)	Mizoram hills	NA

Source: Calculated from DLHS-4 (2013-14) Unit level data.

In the region wise analysis, valley regions in Manipur (91.16 per cent) and Tripura (80.06 per cent) occupied the very high category of accessibility. This may be explained by the fact that both the regions are plain areas which makes it easier to construct roads and promote access to health facilities. The regions which were grouped in the high category included hill regions in Tripura (76.52 per cent) and Sikkim (59.3 per cent) and valley region in Nagaland (61.4 per cent).

Majority of the regions were categorized into medium category which included hilly regions of Manipur (47.10 per cent), Nagaland (45.85 per cent), Arunachal Pradesh (41.46 per cent) and Meghalaya (41.75 per cent). The least accessible region was the Mizoram hilly region which had just 31.01 percentages of villages within 10 Kms.

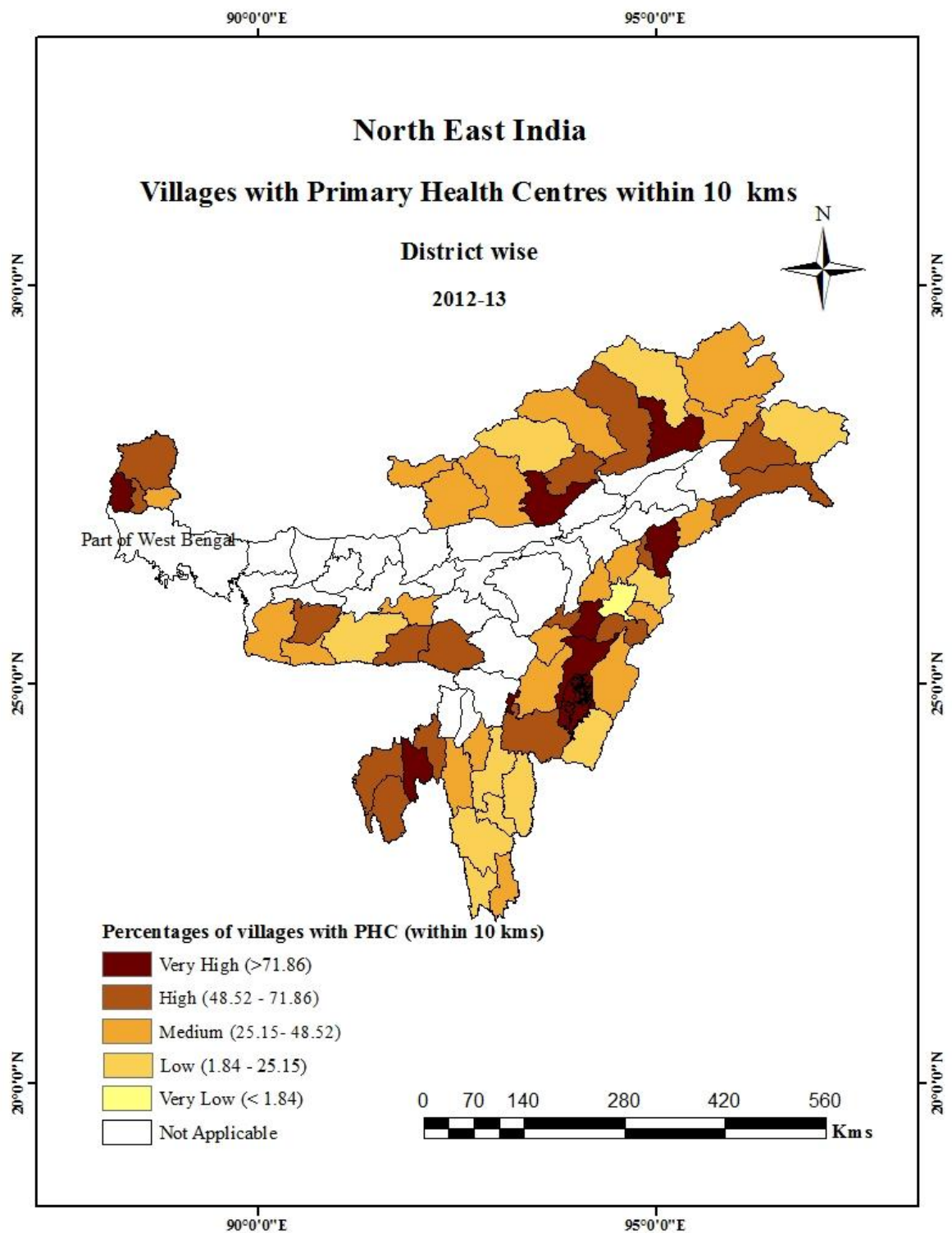
The level of inequality in the accessibility of PHC was medium with a CV of 35.63. However, most of the states had high inequality in accessibility of PHC out of which Nagaland had the highest inequality (CV 49.25) followed by Meghalaya (CV 41.75) while Tripura had the least inequality in accessibility of PHC facility (CV 12.71) Refer to Annexure Table no.2).

#### **b. District level**

There were 11 districts in the very high category where villages located within 10 Kms from PHC. Among these districts, Imphal West (100 per cent), Imphal East (88.89 per cent), Bishnupur (88.24 per cent), Thoubal (87.50 per cent) were top in the list along with Dhalai (85.19 per cent), Papum Pare (80.00 per cent) etc.

Meanwhile, districts with villages within 10 kms from PHC in the range of 71.43-50.00 percentages were included in the high category. Some of the districts in this group were East Khasi Hills (71.43 per cent), South Tripura (69.57 per cent), Dimapur (61.64 per cent) etc. which is shown in the Map 3.7. South Tripura and Dimapur belong to valley region and hence high accessibility.

Those districts with 20-47 per cent of villages having PHC within 10 kms from the villages were grouped in medium category. In this category, the highest accessibility was found in West Kameng (47.06 per cent), Wokha (46.67 per cent), Lower Dibang Valley (45.45 per



Map 3.7 Villages with PHC within 10 Kms across districts in Northeast India, 2012-13.

cent) etc. The least accessible areas were the Kolasib (26.67 per cent), Mamit (29.17 per cent), Saiha (31.58 per cent) etc. of Mizoram.

Aizawl, Serchhip and Lawngtlai of Mizoram, Upper Siang of Arunachal Pradesh, Kiphire of Nagaland occupied the low category. Zunheboto occupied the lowest category with no PHC within 10 kms of villages. The district belongs to hilly region of the state and hence has low accessibility of PHC from villages.

Accessibility has been studied taking into account the percentages of villages lying above 10 kms i.e., in the 10-20 kms category and 20 and above kms category. West Garo Hills (60.61 per cent) and Kurung Kumey (44.44 per cent) had better accessibility had better accessibility as it had most villages within 10-20 kms category. Lawngtlai (8 per cent) and Tirap (9.09 per cent) had least percentages of villages in the 10-20 Kms category as 68 per cent and 54.55 per cent of PHC were located outside the 20 Kms parameter.

Lohit (zero per cent), West Siang (4.35 per cent), East (10.53 per cent) etc. had the least villages with PHC in the 20 and above 20 kms. This showed that the villages in these districts had good accessibility within 20 Kms parameter. The least accessible districts were those of Upper Siang which had 80 per cent villages above 10 kms in PHC while Anjaw had 71.43 per cent above 20 kms from PHC.

There was high inequality in terms of accessibility of PHC within 10 Kms which was indicated by CV of 48.1 (Refer to Annexure Table no.2). The same pattern was reflected in state wise inequality of accessibility of PHC with Nagaland having the highest inequality with a CV of 71.83 and Tripura had the lowest inequality with a CV of 12.71.

### **3.8.3 Community Health Centres**

#### **a. Regional level**

The regional level analysis showed that the valley regions (81.39 per cent) once again had better accessibility than the hilly region (44.22 per cent) in the accessibility of CHC. Amongst states Manipur (62.27 per cent) had the best accessibility in terms of villages with CHC within 20 Kms distance followed by Arunachal Pradesh (54.80 per cent) and Nagaland

(49.37 per cent). While states in terms of poor accessibility was Mizoram (23.89 per cent) followed by Meghalaya (39.51 per cent) and Sikkim (45.28 per cent). These states have been further divided into hills and valley regions which are shown in Table No. 3.25.

Amongst the regions, Manipur valley had the highest accessibility (96.59 per cent). While Tripura valley (66.67 per cent), Arunachal Pradesh (54.80 per cent), Manipur hills (43.81 per cent) etc. were grouped in high category. The hilly regions of Meghalaya and Tripura hills were grouped in low category and Mizoram hills in the very low category with only 23.89 per cent villages with accessibility to CHC within 20 Kms (Table No. 3.25). The level of inequality was found to be low in regional level (CV 24.66 Refer to Annexure Table no.2).

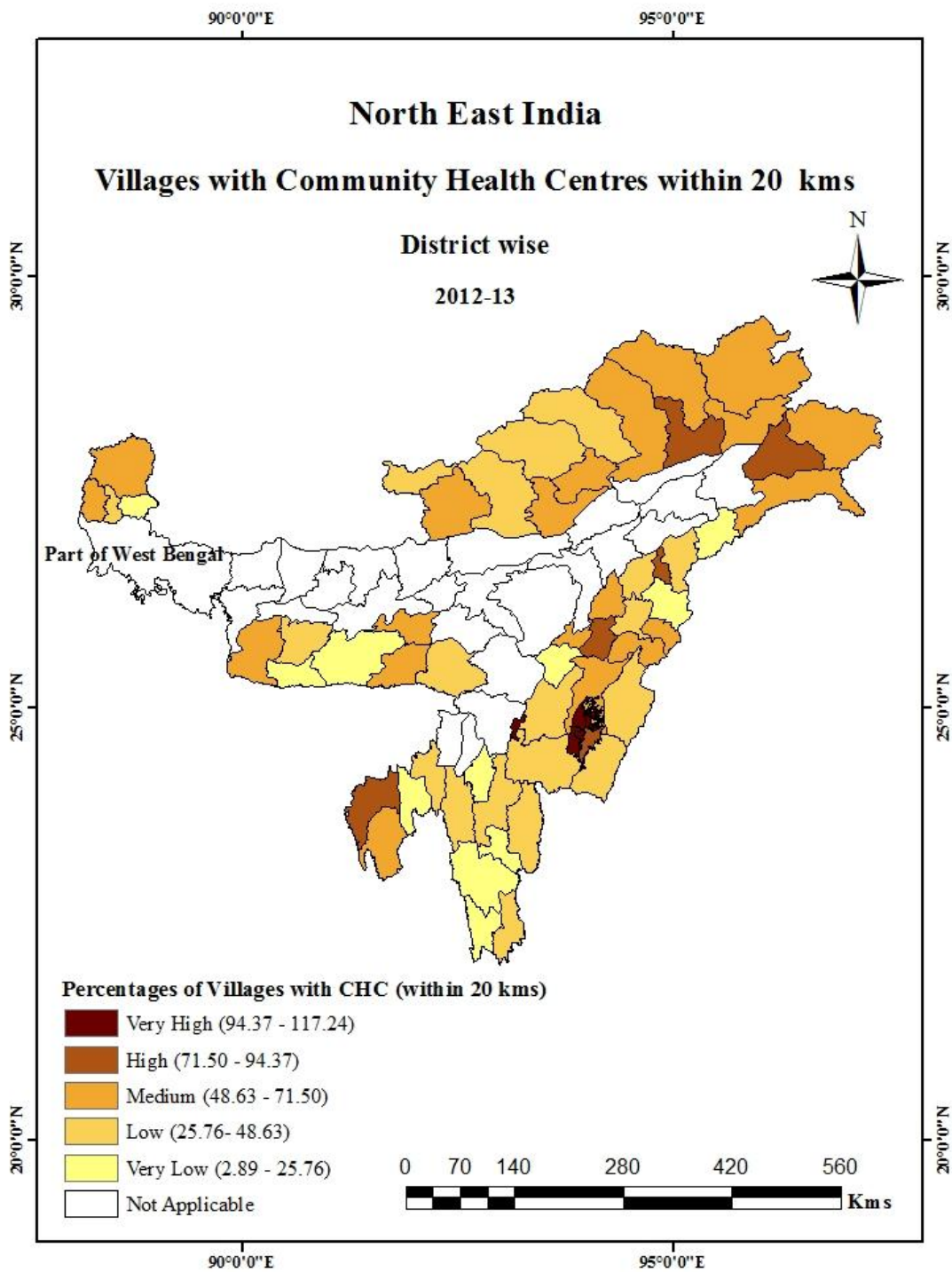
Table No. 3.25 Category of accessibility of CHC within 20 Kms across regions.

Category	Hilly region	Valley region
Very High (90.6 to 110.67) ( $\mu+2SD$ to $\mu+3SD$ )	NA	Manipur valley
High (70.33 to 90.6) ( $\mu+1SD$ to $\mu+2SD$ )	Arunachal Pradesh Hills	Tripura valley
Medium (42.16 to 70.33) ( $\mu$ to $\mu+1SD$ )	Nagaland hills, Sikkim hills, Manipur hills	Nagaland valley
Low (29.79 to 42.16) ( $\mu-1SD$ to $\mu$ )	Meghalaya hills, Tripura hills	NA
Very Low (9.59 to 29.79) ( $\mu-2SD$ to $\mu-1SD$ )	Mizoram hills	NA

Source: Calculated from DLHS-4 (2013-14) Unit level data.

### **b. District level**

A deeper analysis at district level revealed that Imphal West and Imphal East had 100 per cent of villages within 20 Kms of CHC which was found in case of PHC too. These two districts along with Bishnupur occupied the very high category of accessibility. These may be because both the districts are situated in plain areas and hence highly accessible.



Map 3.8 Villages with CHC within 20 Kms across districts in Northeast India, 2012-13.



Districts like Kohima (88.89 per cent), East Siang (72.73 per cent), Longleng (75 per cent) etc. occupied the high category. Kohima being the capital city of Nagaland might have better accessibility to healthcare facilities.

Maximum districts occupied the medium category all of which belong to the hill regions except for Dimapur of Nagaland which is shown in the Map 3.8. The districts include Dibang Valley (66.67 per cent), East Khasi Hills (62.50 per cent), Ri Bhoi (53.13 per cent), Aizawl (50 per cent) etc.

The least accessibility to CHC was found in the districts of Dhalai (25.71 per cent), Serchhip (25 per cent), Ukhrul (33.33 per cent), Upper Subansiri (46.15 per cent) etc. All of these districts were located in the hilly regions and hence construction of CHC within 20 Kms of villages may not be possible. Lastly, the very low category was occupied by South Garo Hills (21.74 per cent), Tirap (21.43 per cent), Peren (9.09 per cent) etc.

In the 21-40 kms category, Kolasib (63.64 per cent) and Tirap districts (53.57 per cent) had the highest percentage indicating the average accessibility of the villages in the regions. These districts had a few villages with accessibility within 20 Kms. While the lowest category occupied by Bishnupur (4.55 per cent), Kiphire (5.26 per cent), Lower Subansiri (6.90 per cent) etc. but have very high percentages of villages with CHC within 20 Kms.

Meanwhile, villages with least accessibility include Peren (63.64 per cent), Saiha (60 per cent) and Lawngtlai (60 per cent) which showed that these villages had very least accessibility to CHC. The villages with very low percentages in the above 40 Kms category included Changlang (3.33 per cent), Tuensang (8.33 per cent), East (9.52 per cent) etc. which had very high accessibility of villages within 20 Kms.

The level of inequality was found to be high at district level with a CV of 44.22. Amongst the state, Meghalaya had the highest inequality in terms of accessibility of CHC with a CV of 48.25 followed by Nagaland with a CV of 47.48 while Arunachal Pradesh had the least inequality (CV 26.82) (Refer to Annexure Table no.2).

In conclusion, it is clear that the valley region had better accessibility than the hilly region. In terms of accessibility of SC, Meghalaya hilly regions had the best accessibility with

Arunachal Pradesh hilly region the least. Amongst districts, the valley district of Bishnupur had the best accessibility and the hilly district of Mamit the least. In terms of PHC and CHC, the valley regions had better performance than the hilly region. At district level too, the valley districts like Imphal East and Imphal West had the best accessibility in CHC. The hill district of East Khasi Hills had the best accessibility in PHC.

### **3.8.4 Patterns of accessibility of Human resources**

The accessibility of human resources has been analyzed taking the availability of Lady Doctor in villages that are either staying or visiting the villages of the total availability. The variable ‘lady doctors who are either visiting or are staying in the villages’ are taken for calculating the accessibility of human resources to the population of the villages. The logical explanation behind this is that the availability of doctors on paper does not reflect the true accessibility of the doctors to villagers. They will only be accessible by the villagers if they are actually available in the villages. The availability of lady doctor is taken as proxy for availability of other doctors due to limitation of data. Also, the IPHS (2007)<sup>39</sup> norm prescribed the mandatory availability of lady doctor in the PHC and as PHC more or less caters to the village population. Also, village aggregate data for the whole district is taken as proxy for the entire districts. This is well justified as most of the PHCs covered in the survey are mostly rural and represent the rural population of the state.

Here, accessibility has been shown using the density of doctor per 10000 populations; this ratio which is a well known method used either for showing availability of healthcare facilities or accessibility. The density of doctor per 10000 populations has been adopted from WHO (2006)<sup>40</sup> which compared the density of health workers per 10000 population in the whole world. Although there is no exact density norm as stated by WHO, the density of 2 doctors per 1000 population has been taken as a good indicator of availability. So, this ratio has been adopted for analyzing the accessibility of human resources in the North Eastern Region of India.

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<sup>39</sup> Directorate General of Health Services (2007), *op. cit.*, p.9.

<sup>40</sup>WHO (2006), *op. cit.*, p. 1-11.

At state level, most of the states like Sikkim and Arunachal Pradesh had eight doctors and seven doctors per 10000 populations respectively. Meghalaya and Mizoram have only four doctors per 10000 populations which are quite low. This indicates the low level of accessibility of human resources in the region.

**a. Regional level**

Among the regions, the valley regions in Tripura, Nagaland and the hilly region in Sikkim were grouped into very high category with eight doctors per 10,000 populations. While hilly region in Arunachal Pradesh and valley regions in Manipur were grouped in high category with seven doctors per 10,000 populations as against the hilly regions of Manipur, Tripura, Nagaland, Meghalaya and Mizoram which had at least four doctors per 10000 populations which is shown in the Table No. 3.26.

This clearly shows that the sub-regions having very low density of doctors per 10000 populations has low accessibility to human resources despite high availability of health care facilities. This may be due to many factors such as inaccessible terrain, absence of lady doctors from the place of postings, unavailability of proper health infrastructure.

Table No. 3.26 Category of human resources accessibility across regions.

Category	Hilly region	Valley region
Very High (8 to 10) ( $\mu+1SD$ to $\mu+2SD$ )	Sikkim hills	Nagaland valley, Tripura valley
High (6 to 8) ( $\mu$ to $\mu+1SD$ )	Arunachal Pradesh Hills	Manipur valley
Medium (4 to 6) ( $\mu - 1SD$ to $\mu$ )	Nagaland hills, Mizoram	hills, Manipur hills, Meghalaya hills
Low (2 to 4) ( $\mu-2SD$ to $\mu-1SD$ )	Tripura hills	NA

Source: Calculated from DLHS- 4(2012-13) Unit level data.

The inequality in accessing human resources was found to be moderate in accessibility with a CV of 31.14 which is the exact opposite in state level CV reflecting high level of inequality.

Mizoram had the highest inequality in terms of accessibility to human resources which was reflected by a CV of 109.32. Sikkim also had high inaccessibility to human resources with a CV of 97.98(Refer to Annexure Table no.2).

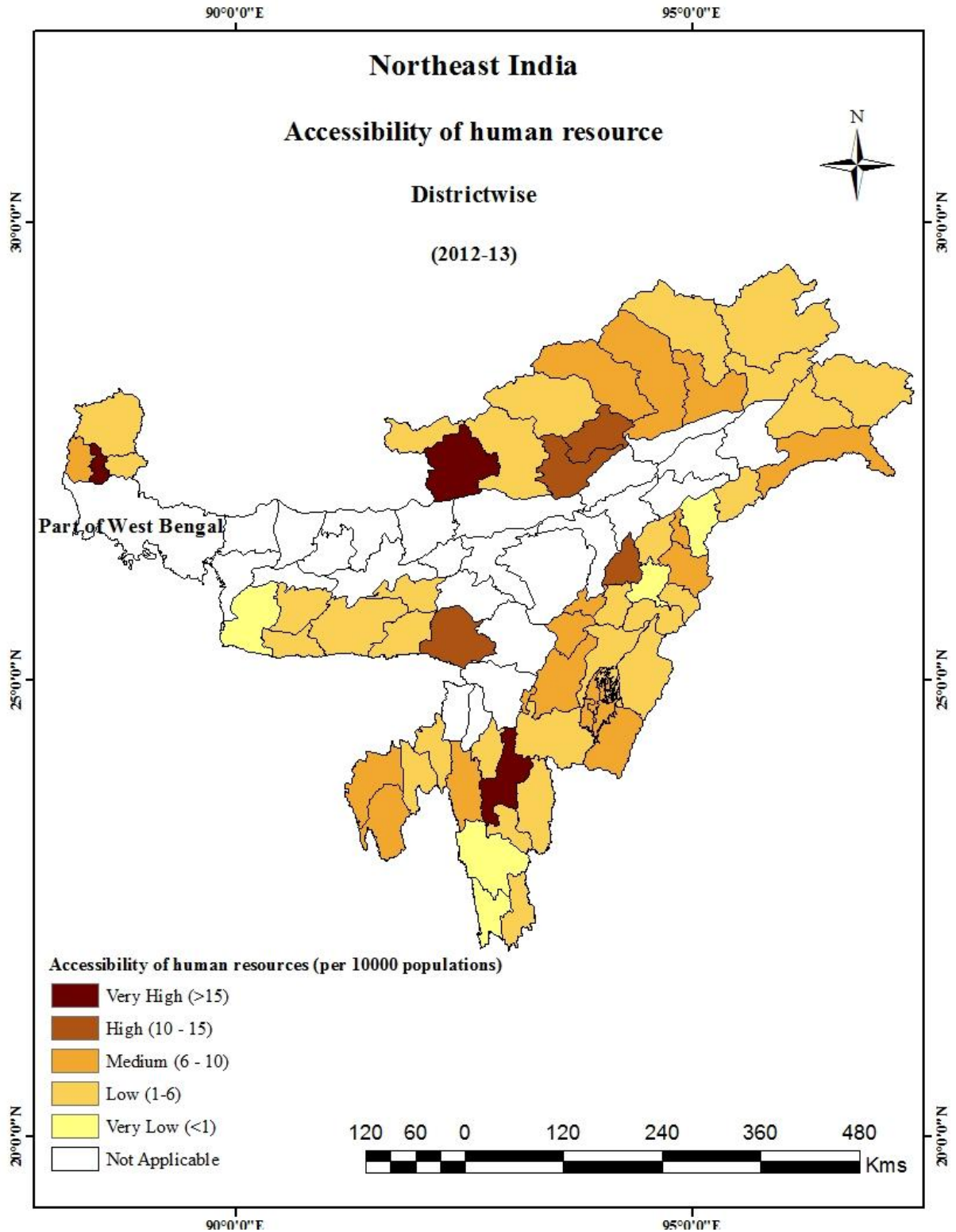
### **b. District level**

In terms of accessibility of human resources, West Kameng (22 doctor per 10000 population), South (19 per 10000 population) and Aizawl (16 per 10000) districts were categorized under very high category of accessibility of human resources. The districts of Lower Subansiri (13 doctor per 10000 population), Jaintia Hills (12 doctor per 10000 population), Wokha (11 per 10000 population) etc. were categorized in the high category. These districts had high accessibility of human resources and also high availability of human resources.

The districts of Longleng (10 doctor per 10,000 population), Changlang (8 doctor per 10000 population), South Tripura (9 doctor per 10000 population) etc. which had a density at least five doctors per 10,000 populations occupied the medium category. These districts also had very high accessibility of CHC and moderate accessibility of PHC and SC. Changlang had moderate accessibility of SCs, PHCs and CHCs. But South Tripura had high accessibility of SCs, PHCs and CHCs.

Districts like the Mokokchung (6 doctor per 10000 population), Kolasib (4 doctor per 10,000 population), Phek (4 doctor per 10,000 population), Dibang Valley (3 doctor per 10,000 population), Ukhrul (2 doctor per 10,000 population), Senapati (2 doctor per 10,000 population) etc. were categorized under the low category. The reason behind this inaccessibility to doctor may be due to low accessibility to SC, PHC and CHC as well as low availability of human resources except for Phek which has moderate availability of human resources but low on accessibility of human resources. The densities of doctors accessible per 10000 populations in these districts are ranging from four to five.

The districts with least accessibility to doctor included the districts of West Garo of Meghalaya, Lunglei of Mizoram and Mon of Nagaland which has zero doctor per 10,000 populations. This may be due to inaccessibility to health centres for example Lunglei had low accessibility of physical infrastructure (8.33 per cent villages were accessible to SC within 3



Map 3.9 Accessibility of human resources across districts in Northeast India.

kms and 9.52 per cent villages were accessible to PHC within 10 kms) possibly due to hilly terrain. The level of inequality was also very high in these districts as indicated by a CV of 74.27. The same pattern was observed in the state level inequality. Sikkim had the highest inaccessibility to human resources with a CV of 97.98 followed by Mizoram with a CV of 80.07. Arunachal Pradesh (CV 71) also had very high inequality in access to human resources(Refer to Annexure Table no.2).

From the above analysis, it is clear that the hilly regions and district has comparatively better accessibility to human resources. At the same time, the hilly regions have the highest accessibility along with Tripura valley region. This is an exception as the hilly region which has high accessibility is comparatively developed than the other regions. So, it is the economic development that determines the accessibility and not the topography in developed regions.

### **3.9 Patterns of affordability of health care facility in Northeast India**

Affordability of healthcare is a multi-dimensional concept ranging from affordability of public and private health care to affordability of insurance facility. The question of affordability of initiating new health schemes or building new infrastructures by the government is another perspective of affordability. A Bamako Initiative undertaken to study the affordability and cost effectiveness of the PHC in Benin and Guinea found that the cost per woman receiving three antenatal visits are US\$ 7 and US\$ 4.7 in Benin and Guinea respectively. While the cost of operating the PHC were US\$ 11,000 and US \$ 9000 in Benin and Guinea respectively.<sup>41</sup>

However, the debate of affordability has been occupied by willingness to pay and affordability to pay for medical care. The mere assumption of willingness to pay for hospital health care may not always be true if compared to the traditional healthcare medicine. The main reason being that alternative payment options for traditional care which may be in cash or kind is not available in hospital. Even if the cost of hospital treatment are usually incurred

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<sup>41</sup>Soucat et al., (1997). Affordability, cost-effectiveness and efficiency of primary health care: The Bamako initiative experience in Benin and Guinea. *International Journal Health Planning, MGMMT.*,12(1), 81-108.

by the individual and small group of family members, the payment of traditional care involves the social pressure upon the healer to consider the financial burden of the people.<sup>42</sup> Hence, willingness to pay does not always mean ability to pay.

The same approach has been adopted in the analysis of affordability of healthcare by the population of Northeast India. Here, the cost of institutional delivery incurred has been taken as proxy for assessing affordability of health care. The cost of institutional delivery is the total expenditure occurred in the form of expenditure incurred for stay in hospital, cost of stay in hospital, cost of medicines, cost for arranging transportation etc. Also, the financial help received from JSY and other schemes has been taken and subtracted from the total expenditure to analyze the actual out of pocket expenditure incurred at the time of delivery. The out of pocket expenditure (OOP) is also analyzed by source which will be giving some insights into the actual affordability of the people for healthcare.

#### **a. Regional**

Regional analysis revealed that valley region recorded higher out of pocket (OOP) expenditure of INR 10,299 than the hilly region of INR 5443. This high OOP expenditure showed that the healthcare services were least affordable in the valley region than the hilly region. This may be because of higher concentration of private health facilities in the valley regions.

While analysis at state level showed that Manipur had the least affordability of health care with highest OOP expenditure of INR 11,649 followed by Arunachal Pradesh with INR 7,511 OOP expenditure. The high OOP expenditure in Manipur does not mean higher ability to pay but willingness to pay. It may also be but due to higher institutional deliveries at private institutes as Manipur has low availability of healthcare services (CI 21.29). Meghalaya reported the highest affordability of OOP expenditure with INR 2,700 on institutional delivery. This may be because of availability of high healthcare services (CI 30.91) in the state.

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<sup>42</sup>Muela, H. S., Mushi. K. A., Ribera, M. J. (2000). The paradox of the cost and affordability of traditional and government health services in Tanzania. *Health Policy and Planning*, 15(3),296-302.

While within the hills and valley regions of the state, valley region in Manipur (INR 13592) had the highest OOP expenditure followed by the hill region in Manipur (INR 10941) and the lowest by hill regions in Meghalaya (INR 2700). The Manipur hill and valley regions had high percentage of other sources (45.88 per cent and 49.68 per cent respectively) and unknown sources of money (37.52 per cent and 23.23 per cent) with low insurance coverage (1.17 per cent and 1.19 per cent respectively). Meghalaya hilly region had very low borrowings (3.10 per cent) but very high percentages of unknown sources (75.60 per cent). This means that Manipur hilly region has the least affordable healthcare services as the region has low availability of healthcare facilities (CI 20.45). Valley region in Nagaland (INR 7865) and hill regions in Arunachal Pradesh (INR 7411) and Sikkim (INR 6514) occupied the medium category. Nagaland valley region had high percentage of insurance coverage (11.76 per cent) and low borrowings (12.92 per cent). On the other hand Tripura hills (INR 3247), Nagaland hills (INR 3251), Mizoram hills (INR 3222) and Tripura valley (INR 4932) were grouped in the low category. These regions had high affordability of healthcare services and high level of inequality.

Table No. 3.27 Category of Affordability of healthcare services

Category	Hilly regions	Valley regions
High (10075 and above) ( $\mu+1SD$ and above)	Manipur hills	Manipur valley
Medium (6514 to 10075) ( $\mu$ to $\mu+1SD$ )	Arunachal Pradesh Hills, Sikkim hills	Nagaland valley
Low (2953 to 6514) ( $\mu-1SD$ to $\mu$ )	Tripura hills, Nagaland hills, Mizoram hills	Tripura valley
Very low (Below 2953) (Below $\mu-1SD$ )	Meghalaya hills	NA

Source: Calculated from DLHS-4 (2012-13) Unit level data.

#### **b. District level**

The highest out of pocket expenditure on delivery were registered in Kurung Kumey and Thoubal which had more than INR 14000 with just INR 1500 financial assistance received

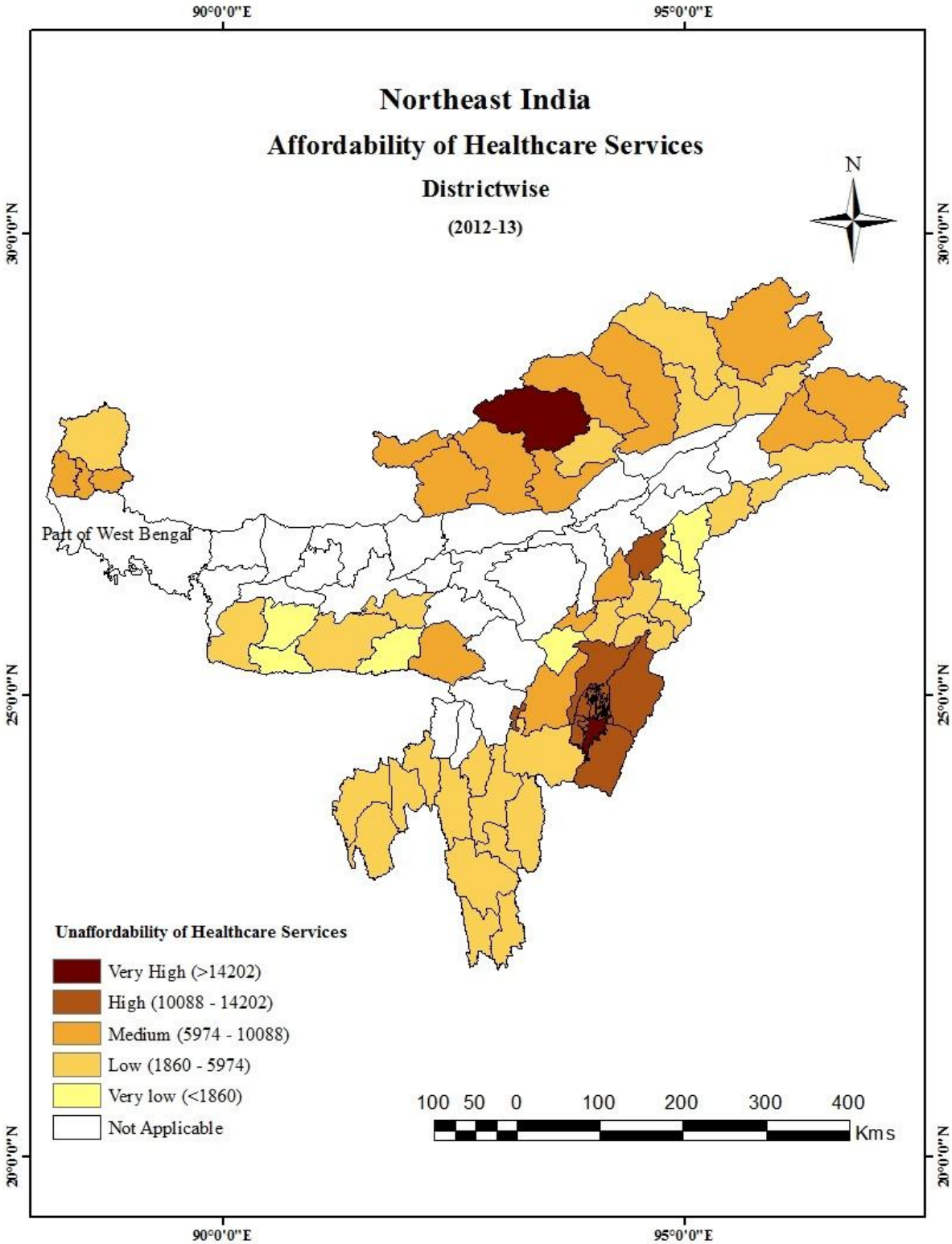


from JSY or the schemes. This means that these districts have very low affordability of healthcare services. AnnexureTable No. 4 gives the OOP expenditure by source which showed that about 7.30 per cent of OOP expenditure of Kurung Kumey was financed through borrowings and 69.53 per cent sources were not known with less than one per cent coverage of insurance. These districts had low have low availability of healthcare services out of which Kurung Kumey had only 25.31 CI of total health facilities available and Thoubal with CI 19.54 which explained the high Out of pocket (OOP) expenditure and unaffordability of healthcare services.

The same goes for districts in the high category like Imphal West, Ukhrul, Mokokchung, Anjaw, etc. which have an OOP of more than INR 10000 with financial assistance of more than INR 1000. However, the two districts of Manipur even if belonging to different regional category had almost the same borrowings of 15.22 per cent and 14.74 per cent respectively. At the same time, OOP expenditures were mostly financed through other sources which might have been monthly income, loans from middle men, money lenders, etc. The borrowings and low insurance coverage revealed unaffordability of healthcare by the people.

Also, in case of Imphal West 7.19 per cent people had sold off their properties or jewellery for financing the institutional delivery. This showed that majority of the people were not able to afford health care and had to sell their jewellery to do so. Rather, they had to depend upon 'social capital' for meeting the expenses of healthcare which clearly showed that the healthcare services were not affordable in Imphal West. This may also be due to unavailability of healthcare facilities as Imphal West district had a CI score of just 22.53 while the highest healthcare facilities was found in Aizawl district of Mizoram which had a CI of 68.43. Another reason may be the unavailability of functional operation theatre, ultrasound facility and critical care facility along with specialist like obstetricians/ gynecologists in the CHC of Imphal West which by providing specialist care may aid in reducing the cost incurred on healthcare (possibly private).

However, Mokokchung of Nagaland had comparatively larger per cent of people financing healthcare through insurance (27.03 per cent) and medium availability of healthcare services (CI 30.91). But the question is how affordable is the health insurance premium offered to the people which will actually give a true picture of affordability of healthcare in the region.



Map 3.10 Affordability of healthcare services across districts in Northeast India.

Also, the districts had larger percentage of people borrowing money to finance institutional delivery i.e., about 10.81 per cent. Districts with an OOP expenditure of Rs 5974- 10088 were grouped in the medium category. The districts included Papum pare, East Kameng of Arunachal Pradesh, Dimapur of Nagaland, Tamenglong of Manipur, East and South districts of Sikkim etc. These districts also received financial assistance from JSY and other Government schemes which amounted to more than Rs 1000. But the people of the remaining districts which afforded the healthcare payments by themselves did not necessarily reflect their ability to pay as revealed by the sources of OOP expenditure consisting of 5.52- 15.50 per cent borrowings. The Unknown sources of money registered a major portion of the OOP expenditure ranging from 37.74- 67.97 per cent respectively. The OOP expenditure may be due to low availability of healthcare facilities in Dimapur (CI 25.74) of Nagaland and Tamenglong (CI 24.54) district of Manipur.

Districts of Changlang, Upper Siang, Tirap etc. of Arunachal Pradesh, Aizawl, Mamit etc. of Mizoram, and Phek, Tuensang of Nagaland etc. occupied the low category. These districts had OOP expenditure ranging from INR 1970 to 5889 and financial assistance of above ₹ 1000. This may be because most of the people can afford the expenditure or they had other means for meeting the expenditure. Amongst these districts Tuensang had the highest percentage of people borrowing (41.12 per cent) followed by Mamit (12.93 per cent) while Phek had the highest percentage of people under insurance (59.26 per cent) with zero per cent borrowings. This district can truly afford to pay for institutional delivery. Changlang and Tirap had very high percentage of unknown sources of financing institutional delivery (> 70 per cent). Moreover, the low OOP expenditure may be due to high availability of healthcare facilities as in the case of Aizawl which had the highest availability of healthcare facilities with a CI of 68.43 as against the lowest of 10.79 in Chandel. The same reason can be applied to Phek which had high availability of health care facilities with a CI of 36.76. This underscores the importance of public healthcare facilities like the SC, PHC, CHC and DH in ensuring affordability to healthcare services.

Districts like Longleng and East Garo Hills were categorized under the very low category. These districts did not have any OOP expenditure at the time of institutional delivery. Rather, they received more financial help from the schemes than they spent on healthcare. This was

possible in Longleng because of insurance coverage of more than 43 per cent (refer to AnnexureTable no. 4) which was quite high when compared to other districts. Other districts which were categorized in the very low coverage were Mon, Peren and Kiphire of Nagaland which also had good percentage of insurance coverage. While the financial assistance given by the government remained more or less the same for all the districts with a minimum of Rs 1000. The rest was financed by borrowings, unknown sources and other sources.

The level of inequality was very high amongst the districts with a CV of 59.55 (Refer to Annexure Table no.2). The same pattern of high inequality was seen in the state wise CV of Nagaland (CV 94.32) and Meghalaya (CV 4.92). Sikkim had low inequality in affordability of healthcare services with a CV of 19.68. In case of Nagaland it had been observed that it has very low OOP expenditure which showed the high affordability in the state. However, the existence of high inequality revealed that the healthcare services were not affordable in a uniform manner in the entire state.

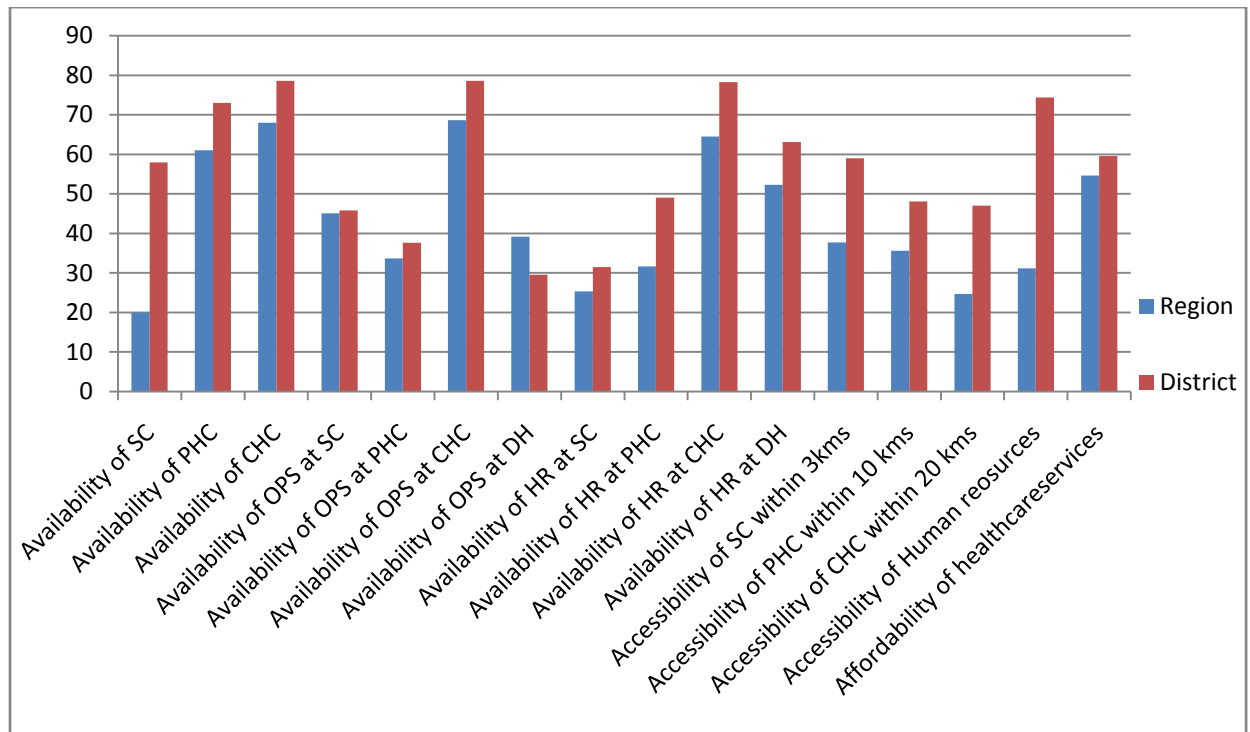
The above analysis of OOP and coverage of insurance may give a fair picture that medical expenses are affordable for the people of North east. But a closer look at the percentage distribution of OOP expenditure by source will give altogether a different picture of affordability. We have seen that even regions which can actually afford the cost of delivery, they are largely met by borrowings or unknown sources like in the case of Manipur. This means that they are actually willing to pay. While the region with least OOP expenditure has very low ability to pay and hence cannot afford much even though they are willing to pay. At micro level, districts with least affordability has very low OOP expenditure but high percentage of unknown sources of expenditure with low insurance coverage like that of East Garo hills.

### **3.10 Inequalities of healthcare services available, accessible and affordable**

Figure No. 3.1 reveals that there is high inequality at availability of human resources at CHC followed by availability of human resources at DH at district level. At regional level, healthcare services is highly unequal in term of availability of healthcare services at CHC and availability of human resources at CHC.

Inequality is found to be lowest in availability of Human resources at district level. While at regional level, inequality is found the lowest in availability of SC facilities. It is also found to be low in accessibility of CHC within 20 kms at regional level.

Figure No. 3.1 Level of inequalities indicator wise, NER, 2012-13



Note: OPS stand for Other Physical Health Services, HR: Human Resources.

Other indicators like accessibility of human resources, affordability of healthcare services, availability of PHC, availability of other physical healthcare services at CHC etc are found to be high at district level.

### 3.11 Conclusion

Health care facilities have been analyzed in terms of availability, accessibility and affordability. Availability of healthcare reveals that there is still shortage of the most basic facilities like sub-centres, primary health centres and community health centres at regional and district level. Apart from the shortage of physical healthcare facilities, there is huge shortage of human resources. Even after 71 years of the recommendation of the Bhoré

committee to provide six medical officers to a primary unit, the present norms have been diluted. IPHS (2007) had recommended only three MO in the primary health facilities. So, the actual availability of human resources like MO, Lady MO and other specialist doctors might be even lesser than the prescribed norms. Infact, the hill region in Northeast has huge shortages of human resources like gynecologists, radiographer, pediatrician etc. The same can be said for those districts lying in the hilly regions of Northeast India. In terms of accessibility too, the hilly regions were found to be least accessible in sub-centres, primary health centres and community health centres which showed the dominance of spatial factor over non-spatial factor. In terms of affordability, the valley regions and districts which had low availability of healthcare facilities are found to have very high out of pocket expenditure like in the case of valley regions in Manipur. This shows that the healthcare facilities are largely unaffordable to the people due to lack of public healthcare facilities and hence the need ensure availability, accessibility of healthcare facilities which in turn will lead to affordability of healthcare facilities. Moreover, the existence of high inequality of availability, accessibility and affordability of healthcare facilities point to the need to ensure more uniform providence of healthcare facilities in Northeastern states of India.

## Chapter 4

### Healthcare Outcome in Northeast India

#### 4.1 Introduction

The outcome of healthcare has been measured using morbidity, mortality, crude death rate etc.<sup>1</sup> Utilization of healthcare facilities has also been used a measure of outcome of healthcare facilities. The logic behind performance of outcome analysis is to improve the quality of healthcare services through analysis of the effectiveness of the policy programmes upon the health of the people. Morbidity and mortality has been studied as a separate entity and have not been linked with the healthcare facilities that are actually available.<sup>2,3</sup> However, linking healthcare facilities with outcome of health like prevalence of diseases and deaths are essential as they often influenced by availability of accessible and affordable healthcare especially in rural and topographically rough regions like the Northeastern part of India.

Sankar & Kathuria (2004)<sup>4</sup> in a study analyzed health outcomes with efficiency of health system in 16 states of India. It found that in case of two states like Gujarat and UP which had almost identical average figures of Phcpc<sup>5</sup> and Drpc<sup>6</sup> variables and differing Bedpc<sup>7</sup> and Totalbir<sup>8</sup> figures, there were difference in average IMR which was 104 in case of Uttar Pradesh and 80 in case of Gujarat. This showed that states which had better health facilities in terms of number of health facilities per 10,000 rural population and qualified doctors per 10000 population coupled with higher bed population ratio and attended births had more chances of reducing the incidence of IMR. It was also found that better utilization of

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<sup>1</sup>Krousel-Wood, M, A. (1999). Practical considerations in the measurement of outcomes in healthcare. *Ochsner Journal*, 1(4), p. 187.

<sup>2</sup>Rani, M., Bonu, S., Jha, P., Nguyen, S.N & Jamjoum, L., (2003). Tobacco use in India: Prevalence and predictors of smoking and chewing in a national cross sectional household survey. *Tobacco Control*, 12, 1-9.

<sup>3</sup>Visaria, L. (1985). Infant mortality in India: Levels, trends and determinants. *Economic and Political Weekly, Special article*, pp. 1353-1356.

<sup>4</sup>Sankar, D. & Kathuria, V. (2004). Health system performance in rural India: Efficiency estimates across states. *Economic and Political Weekly*, p. 1431.

<sup>5</sup>Phcpc means number of (Government) PHC per 1,00,000 rural population.

<sup>6</sup>Drpc means number of (Government) doctors per 10,00,000 rural population.

<sup>7</sup>Bedpc means hospital beds per 1,00,000 rural population.

<sup>8</sup>Totalbir means percentages of birth attended by doctors or skilled birth attendant.

health facilities led to differential decrease in IMR which was 54 per cent in Gujarat and 43 per cent in UP during 1986-87. It also conducted regression of “efficiency index against non health system determinants efficiency like income, rural literacy, extent of urbanization, health expenditure as a share of GDP and per capita health expenditure by state”<sup>9</sup> and found that literacy contributed to the ‘relative efficiency of health system’.

Morbidity has been used in several studies to show the status of health. Morbidity has been analyzed amongst the state, social groups, economic groups etc. Several studies based on NSSO survey and other surveys have studied morbidity based on chronic and acute ailment prevalent, private and public healthcare, across social groups etc (Sundar & Sharma, 2002<sup>10</sup>; Sen, 2002<sup>11</sup>; Nangbam & Laishram, 2015<sup>12</sup>).

Schneider (2002)<sup>13</sup> stated the use of mortality as an outcome of quality healthcare as one of the goals of various institutions and agencies, governments and demographers etc. But, in the study of ‘mortality as an outcome of quality healthcare’ other factors socio-economic, geographical, political etc must also be considered.

Mant (2001)<sup>14</sup> had stated the use of mortality rate of infants and mothers as an outcome measure of health care services. The care given at the time of treatment or the skill of the surgeon conducting surgery all decides the outcome of healthcare. However, there are certain risk factors which may have been associated with the patient or socio-economic status of the patient which may determine the outcome of healthcare.<sup>15</sup>

The quality part of the healthcare services has been answered by the availability of healthcare services such as the specialists doctors like Obstetricians/Gynaecologists,

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<sup>9</sup>Sankar, D. & Kathuria, V. (2004).*op. cit.*, p. 1432

<sup>10</sup>Sundar, R.&Sharma, (2002). Morbidity and utilisation of healthcare services: A survey of urban poor in Delhi and Chennai.*Economic and Political Weekly*, 37(47), pp.4473.

<sup>11</sup>Sen, A. (1998). Mortality as an indicator of economic success and failure.*The Economic Journal*, 108(446), p.19.

<sup>12</sup>Nangbam, S. & Laishram, L. (2015).Burden of disease and benefit incidence of public health expenditure in Northeast India. *Journal of Health Management*, 17(3), 328-338.

<sup>13</sup>Schneider, E.C. (2002). Measuring outcomes to improve health care: Rational use of ratings and rankings.*Medical care*, 40(1), p. 1.

<sup>14</sup> Mant, Jonathan (2001). Process versus outcome indicators in assessment of quality of healthcare.*International Journal for Quality in Health Care* 2001, 13(6), 475-480.

<sup>15</sup>*Ibid.*



Pediatricians, Anesthetists etc at community health centres. Accessibility to well equipped healthcare facilities and qualified doctors will ensure that quality healthcare facilities are being provided to the people. The health facilities should be provided with all the facilities such as electricity, water, functional laboratory, blood storage etc so as to ensure access to quality healthcare services. This may have an impact upon the health outcomes. This points to need to study the outcome of health from the perspective of quality healthcare services and also the role played by the socio-economic factors of the population. For example belonging to particular social group or engaging in particular occupation (hard labour at field) may leave the person vulnerable to certain diseases which may lead to poor outcomes of health.

Anand & Barnighausen (2004)<sup>16</sup> in their cross-country study using ‘WHO 2004 datasets on Estimates of health Personnel’ have linked health care outcomes with availability of human resources for health. Mortality rate such as MMR, IMR and URMR were taken as dependent variables and human resources as independent variables. It found that doctor density had a significant impact upon reducing the incidence of maternal mortality (38 per cent), infant mortality (17 per cent) and under five mortality (21 per cent). The test was significant at 1 per cent for MMR and 5 per cent for IMR and under five mortality rate. Thus, healthcare facilities had a significant impact upon reducing the mortality outcomes.

#### **4.2 Morbidity as an outcome measure**

Morbidity is simply known as any departure from the state of well-being.<sup>17</sup> It may be physical well-being or mental well being. As WHO (2013)<sup>18</sup> aimed to achieve universal health coverage through ensuring the availability and affordability of healthcare facilities, it is important to see the effects of health care facilities upon the outcomes of health which may be morbidity, mortality, crude death rate etc. Due to data constraints, the present study has taken morbidity as proxy for healthcare outcomes although it is not an outcome variable.

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<sup>16</sup>Anand, S & Barnighausen, T. (2004). Human resources and health outcomes: Cross-country econometric study. *Lancet*, 364, 1603-06.

<sup>17</sup>Last, J.M. (1983). *A Dictionary of Epidemiology* (edited). Oxford University Press, p.44.

<sup>18</sup>The WHO Report (2013). *Research for Universal Health Coverage* (pp.5-146). Geneva: World Health Organization.

Morbidity can be taken as an outcome measure based on the different types of outcome measure given by Krousel-Wood, (1999)<sup>19</sup>. The different types of outcome includes “morbidity (examples- chronic disease, complications), mortality (ten-year mortality/survival, in hospital mortality), Pain (acute, chronic), satisfaction (overall satisfaction, satisfaction with quality of health care) and cost (resources utilization, cost-effectiveness, cost benefits)”<sup>20</sup>. In the study the morbidity as chronic disease has been taken as outcome of healthcare.

As health outcome is “a change in health status of an individual, or group or population which is attributable to a planned intervention or series of interventions” (WHO, 1998)<sup>21</sup>. The study assumes that lesser prevalence of diseases or illness is due to intervention by healthcare facilities. The interventions are the various services given by healthcare units while the health status is that of morbidity prevalent in Northeast India with the assumption that the people had interaction with the healthcare facility at any time of illness. Lesser prevalence of disease means more effective healthcare system and vice versa. However, the limitation of the data has to be kept in mind as the process data for healthcare treatment by doctors are not available.

According to Donabadien (1992)<sup>22</sup> “Outcomes are the paramount criterion of good quality either by themselves or as related to costs if efficiency and optimality are to be determined.” Since, the present study is an attempt at the availability of healthcare which also involves the deeper question of healthcare as it analyzed the availability of essential healthcare facilities at the health centres, morbidity prevalence can be taken as an outcome in to assess the quality of health care system existing in the Northeast India. Hence, these indicators will be taken as an outcome measure of health keeping in mind the unavailability of process data (what is done in the care of patients and how it is done).

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<sup>19</sup> Krousel-Wood (1999), *op. cit.*, p. 187.

<sup>20</sup> *Ibid.*

<sup>21</sup> WHO (1998). Health promotion glossary (p. 10). Geneva: World Health Organization.

<sup>22</sup> Donabadien, A. (1992). The role of outcomes in quality assessment and assurance. *Quality Review Bulletin*, 18(11), p. 356.

### 4.3 Morbidity as a demand side variable

Morbidity is the occurrence of diseases. Occurrence of diseases will cause demand for health and demand for health or good health will lead to demand for healthcare. Demand for healthcare will lead to supply of health. Healthcare is demanded by the people based on the belief that they will get certain 'investment benefits'. Healthcare is a derived demand and is demanded by the consumer for engaging in production and consumption activities. However, demand for healthcare will only occur when the consumer is ill even if they would rather not be ill.<sup>23</sup> Demand and supply in healthcare means the healthcare requirement of the people, their choices in seeking healthcare and the available healthcare facilities respectively (Mooney, 1997).<sup>24</sup>

Morbidity is of different types with major types being chronic and acute diseases as. The occurrence of different types of morbidity will cause demand for different types of healthcare. However, demand for health is also dependent upon "education, age, sex, social class, insurance coverage and behavior problem."<sup>25</sup> Mukherjee & Karmakar (2008)<sup>26</sup> studied the demand side variable related to untreated morbidity using NSSO 60<sup>th</sup> round data. It focused upon three aspect of demand of healthcare the age groups, income quintile and literacy level and found that the demand for healthcare increases for old age groups as compared to the productive age groups due to their tendency to neglect healthcare. Furthermore, the demand for healthcare decreases with lower level of literacy as indicated by untreated morbidity (45 per cent) where the head of household is illiterate while that of head of household with highest level of education has just 7 per cent untreated morbidity. For income groups, those on the lowest quintile demand lesser healthcare due to financial constraints while for those on higher quintile, perceived good health causes lesser demand.

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<sup>23</sup>McMuir, Alistair., J. Henderson & G, Mooney (1988). *The Economics of Health Care: An Introductory text* (p. 3). Routledge and Kegan Paul.

<sup>24</sup>Mooney (1987), *op.cit.*, pp. 296-300

<sup>25</sup>Gaag, J. V. D. & Ven, W. D. (1978). The demand for primary health care. *Medical Care*, 16(4), p. 300.

<sup>26</sup>Mukherjee, A. N. & Karmakar, K. (2008). Untreated morbidity and demand for healthcare in India: An analysis of national sample survey data. *Economic and Political Weekly*, pp. 73-76.

#### 4.4 Classification of morbidity

Morbidity has been classified into two groups acute illness reported in last 15 days and chronic illness reported during last 1 year. Due to different types of chronic diseases being reported in the DLHS-4 (2012-13) survey, the chronic diseases have been further regrouped into 13 categories of diseases based on 10th ICD (2016) for better analysis of the data. illness. This classification of the DLHS- 4 has been followed for acute illness. DLHS-4 reported only nine type of acute illness such as the RTI, ART-infection, dysentery, diarrhoea, fever- with chills-rigoris-malaria, other-fever and Other type of illness etc.

Table No. 4.1 Types of Chronic diseases.

I	Infectious and Parasitic Diseases.
II	Neoplasm.
III	Blood and blood forming organs and certain disorders involving Immune system.
IV	Endocrine,Nutritional and Metabolic diseases.
VI	Diseases of the nervous system.
VII	Diseases of the Eye and Adnexa.
X	Diseases of the Respiratory system.
IX	Diseases of the Circulatory system.
XI	Diseases of the Digestive system.
XII	Diseases of the Skin and sub-cutaneous tissue.
XIII	Diseases of Musculoskeletal system and Connective tissue.
XIV	Diseases of Genitourinary System.
**	Others.

Source: 10 ICD, 2016 Classification of Disease. \*\* Diseases not diagnosed and cannot be put under any category.

Chronic diseases reported by DLHS- 4(2012-13)<sup>27</sup> include certain infectious and parasitic diseases like leprosy, T.B., endocrine, nutritional and metabolic diseases like diabetes, thyroid/ Goitre, diseases of the nervous system like stroke and epilepsy, diseases of the circulatory system like hypertension, chronic heart diseases, myocardial infection/ heart attack, heart diseases etc., diseases of respiratory system like Asthma, chronic respiratory failure, sinusitis, tonsillitis etc., diseases of the digestive system like gallstone, chronic liver diseases, hernia, hydrocele, peptic ulcer etc., diseases of genitourinary system like fissure, chronic renal diseases etc., neoplasm like cancer, tumor, blood cancer, skin cancer etc (Refer to Annexure Table no. 10).

#### **4.5 Major types of morbidity prevalent in Northeast India**

The various ailment reported by the DLHS 4 (2013-14) had been grouped under acute diseases which were observed during last 15 days and chronic diseases reported under last one year at the time of survey.

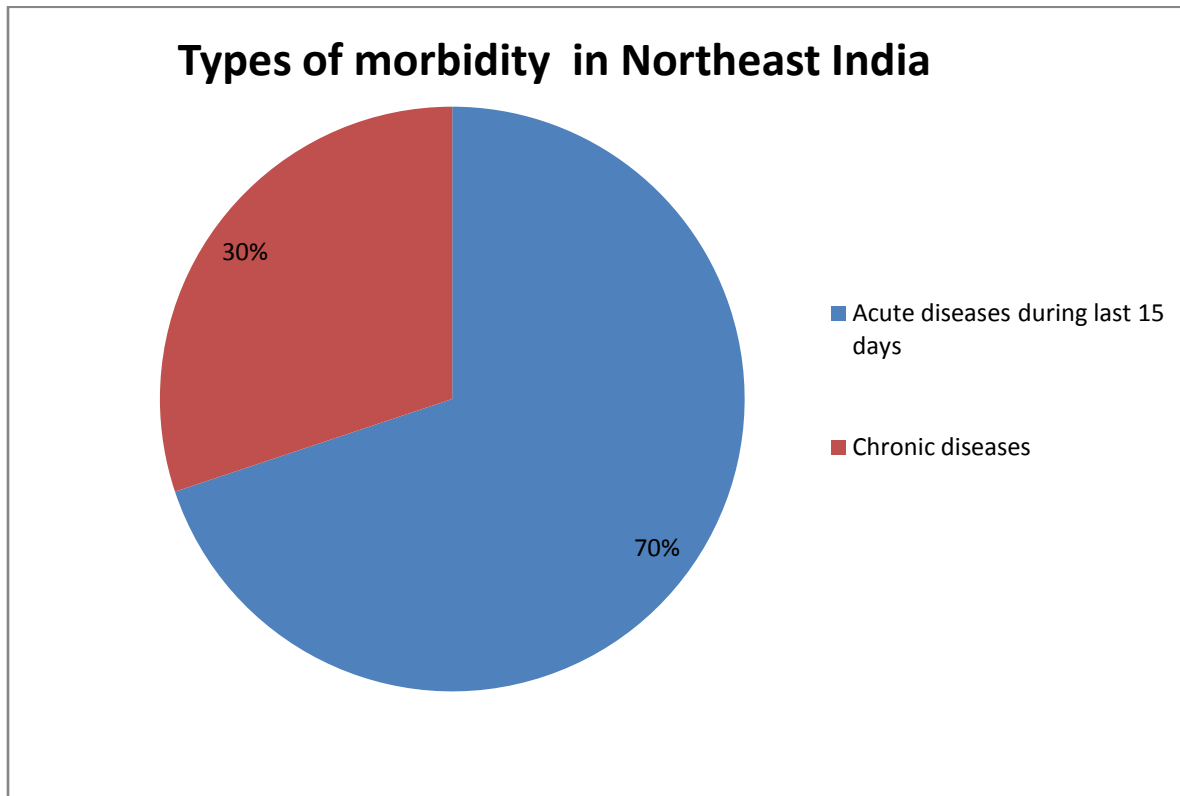
The pie chart in Fig.4.1 shows that the prevalence of acute diseases is more than the chronic diseases in Northeast India with 70 per cent of the sample population suffering from some form of illness. While chronic diseases were reported amongst 30 per cent of the population. The same finding was reported by another study which found in rural northeast found that the burden of diseases was dominated by communicable diseases like fever (13per cent), diarrhoea or dysentery (14.3per cent), respiratory diseases (7.9per cent) etc. While others diseases like gastritis (8.8per cent), disorders of joints and muscles (6.4 per cent) also forms a part of the disease burden (Nangbam & Laishram, 2015).<sup>28</sup> With increasing numbers of prevalence of acute illness and chronic diseases, the role of healthcare system becomes very important in reducing the prevalence of diseases. It is all the more important as acute care provided by the primary healthcare system can save lives or ameliorate the pain caused by injury or illness.

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<sup>27</sup>International Institute for Population Sciences (IIPS) (2014). *District Level Household and Facility Survey (DLHS-4), 2012-13: Household questionnaire.*, p.5.

<sup>28</sup>Nangbam, S. & Laishram, L. (2015). Burden of disease and benefit incidence of public health expenditure in Northeast India. *Journal of Health Management*, 17(3), p. 331.

Fig. 4.1 Types of Morbidity in Northeast India.



Source: Calculated from DLHS 4 (2012-13).

Care given at right time and with correct diagnosis, acute illness can be cured at right time before it turns chronic. Here, care given to patients at entry point becomes very important for patients with 'emergent and urgent conditions' (WHO, 2013)<sup>29</sup> Thus, the quality of care given to acute illness becomes very important. There is also a huge dependency of chronic diseases upon the health system which is not so in case of acute illness. Moreover, chronic patients involve heavy expenditures which are not necessarily the case for acute illness (Priester et al., 2005).<sup>30</sup> Difference between them lie in the fact that acute illness care is more oriented towards treatment of immediate symptoms while chronic care involves sustained

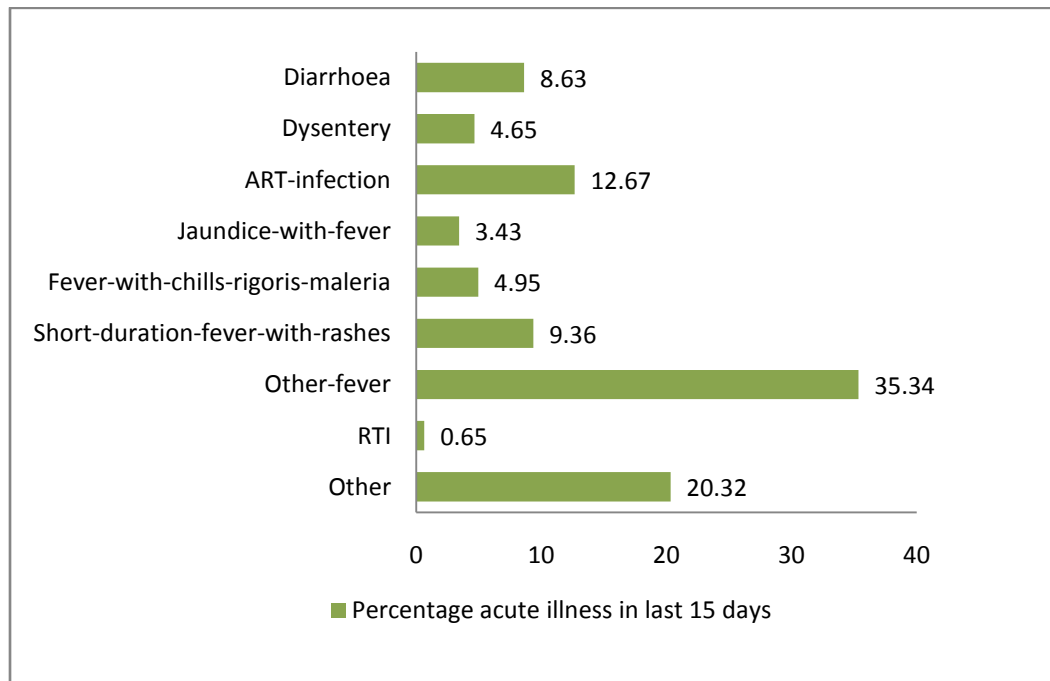
<sup>29</sup>WHO (2013). Retrieved from <http://www.who.int/bulletin/volumes/91/5/12-112664/en/>

<sup>30</sup>Priester, R., Kane, R. L., & Totten, A. M. (2005). How the current system fails people with chronic illnesses. In R. L. Kane, R. Priester, & A. Totten (Eds.), *Meeting the challenge of chronic illness* (p. 6). Baltimore: Johns Hopkins University.

treatment. Also, in terms of quality of care given, chronic diseases demands training and knowledge beyond the knowledge required for acute conditions. Some of the skills involve “care coordination, behavior modification techniques and patient education”<sup>31</sup> etc.

#### 4.6 Types of Acute diseases reported by DLHS- 4 (2012-13)

Fig. 4.2 Percentage of acute illness during last 15 days.



Source: Calculated from DLHS - 4 (2013-14).

The District level Household Survey-4 reported nine major acute diseases prevalent in Northeast at the time of survey. Among them, the most prevalent disease is ‘other fever’ which was reported among 35.54 per cent of the people. Next is followed by ‘Other’ types of acute diseases which cannot be grouped under a particular category. The ‘Other’ type of diseases was reported among 20.32 per cent of the people in Northeast.

Another major acute illness reported is ART infection which was reported amongst 12.67 per cent population. A similar finding of ART infection has been found to be associated with

<sup>31</sup>*ibid.*, p. 12

socio-economic group in the developing countries with lowest found among those belonging to high socio-economic group and highest among those category of people belonging in the lowest socio-economic strata.

This finding was consistent among all age groups except for those belonging to the age group of  $\geq 70$  years, possibly due to higher life expectancy among those belonging to high socio-economic category.<sup>32</sup> The lowest among the acute diseases reported is Respiratory Tract Infection which was among 0.65 per cent of the people.

#### **4.7 Types of Chronic illness reported during last one year in Northeast India**

The major diseases reported during the last one year has been recoded and classified following the disease classification of ICD 10, 2016. Accordingly, 13 classifications of diseases have been made, of which only 13 are reported in Northeast India (Fig. 4.3)

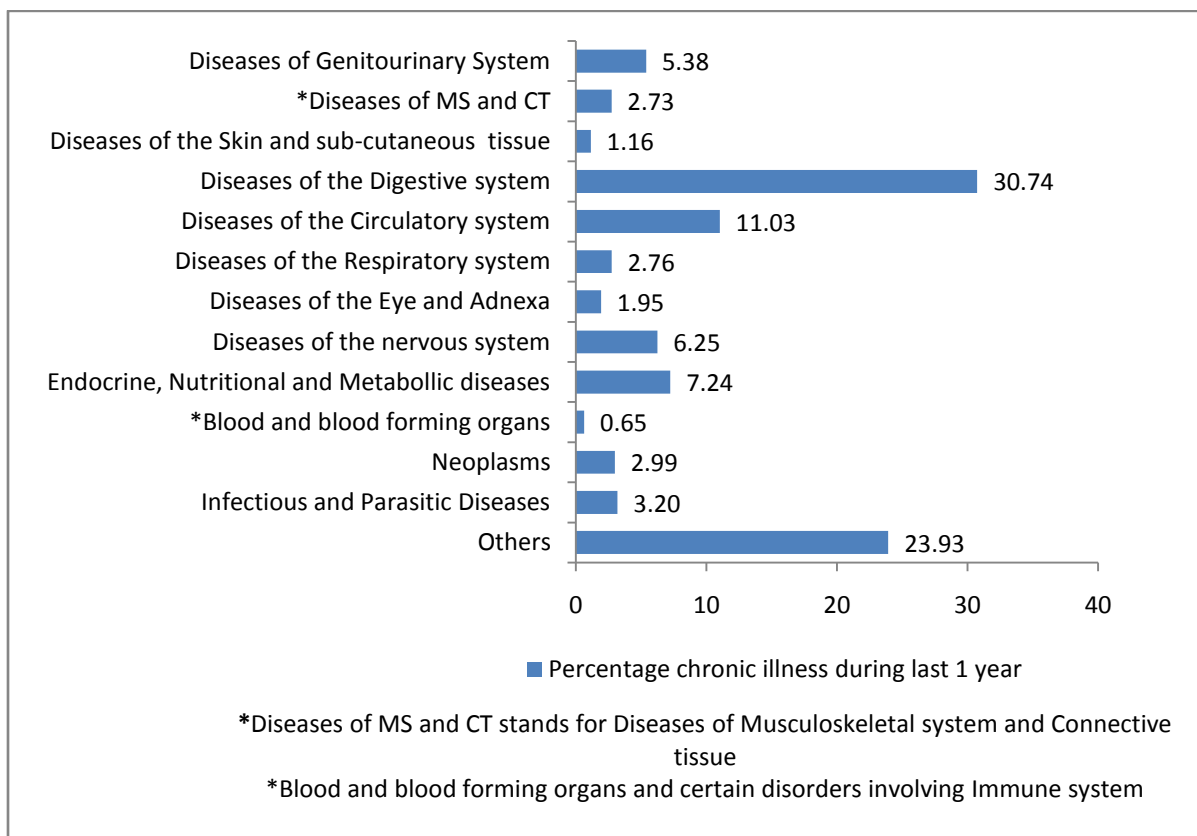
In Northeast, chronic diseases of the digestive system were found to be the most prevalent in the entire northeast with 30.74 per cent of the sample population suffering from it. It was followed by other diseases with 23.98 per cent which were diagnosed. Diseases like those of digestive system, genitourinary system, circulatory system, nervous system also reported high prevalence. While the disease of blood and blood forming organs reported low prevalence with 0.65 per cent in entire Northeast. Diseases of the skin and sub-cutaneous tissue also have low prevalence with prevalence rate of 1.16 per cent.

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<sup>32</sup>Tupasi, T.E., Velmonte, M.A., Sanvictores, M.E., Abharam, L., ....Saniel, M.C.(1988). Determinants of Morbidity and Mortality Due to Acute Respiratory Infection: Implications for Intervention. *The Journal of Infectious Diseases*,157(4), 615-618.



Fig. 4.3 Percentage distribution of chronic illness in Northeast India during last 1 year.



Source: Calculated from DLHS - 4 (20013-14).

## 4.8 Prevalence of Acute diseases

### a. Regional

The acute diseases are found to be more prevalent in the valley regions than the hilly region with an average prevalence of 160 per 1000 population and 121 per 1000 population respectively. This may be due to “local factors like the genetic and nutritional differences and lack of personnel hygiene”<sup>33</sup> and also the environment factor like the sub-tropical climate of northeast where there is abundant amount of rainfall and frequent occurrence of floods and other natural calamities. Thus flood and calamities are often followed by outbreak of acute

<sup>33</sup> Ramanathan, N.L. & Kashyap, S. (1975). Occupational Environment and Health in India. *Ambio*, 4(1), pp. 60-64.

diseases like diarrhoea, dysentery, short term fever etc. which are reported more in Northeast than the non-communicable diseases.

Within the states, Manipur (204 per 1000 population) had the highest prevalence of acute diseases followed by Arunachal Pradesh (176 per 1000 population), and Mizoram (105 per 1000 population) .While the lowest prevalence was found in Meghalaya (48 per 1000 population) followed by Nagaland (71 per 1000 population). These are further divided into sub-regions of hills and valleys and are categorized accordingly. Acute disease was found to be most highly prevalent in Manipur hills and valley region. The most prevalent illness was diarrhea, dysentery, other fever etc. This may be because facilities of SC and PHC are found to be quite low in Manipur. This may have led to delay of treatment of any acute illness. Furthermore, the accessibility of SC which is the first contact point between patient and healthcare services is low in hill regions and hence higher prevalence of acute illness.

Table No. 4.2 Category of prevalence of acute diseases across regions.

Category	Hill	Valley
High ( $\mu+1SD$ and above) (177 and above)	Manipur hills	Manipur valley
Medium( $\mu$ to $\mu+1SD$ ) (125 to -177)	Arunachal Pradesh Hills	NA
Low ( $\mu-1SD$ to $\mu$ ) (60 to 125)	Mizoram hills, Sikkim hills, Nagaland hills	Tripura valley, Nagaland valley
Very Low (Below $\mu-1SD$ ) (Below 60)	Meghalaya hills	NA

Source: Calculated from DLHS-4 (2012-13) Unit level data.

Hilly region of Arunachal Pradesh (172 per 1000 population) occupied the medium category with other fever (29.43 per cent) and ART- infection (26.32 per cent) the most common illness. This may be due to low availability of human resources (CI 5.04) in the region which might have given preventive and curative care at times of illness. It may also be due to the low accessibility of sub- centres which had only 24.49 per cent of the villages within 3 kms of the

SC. The presence of SC within 3 kms might have aided in preventing the outbreak of acute diseases in the region through its' curative and promotive works.

Hilly regions in Mizoram (105 per 1000 population) and Sikkim (99 per 1000 population) and Valley regions in Tripura (86 per 1000 population) and Nagaland (80 per 1000 population) occupied the low category. Other fever was highly reported in these regions with the highest being reported in Sikkim (40 per cent). Sikkim (Composite index 36.72) and Mizoram hilly (CI 37.10) region had high availability of healthcare services and hence low prevalence of acute illness. While Valley regions in Nagaland (CI 25.74) and Tripura (CI 25.28) valley had medium availability of healthcare services and low prevalence of acute illness which may be due to low reportage or traditional healthcare at home.

Hilly region of Meghalaya (45 per 1000 population) occupied the very low category which also had medium availability of healthcare services (CI 30.91) and very high (61.50 per cent) accessibility of sub-centres.

#### **b. District level**

The highest prevalence of acute diseases was found to be very high in Lohit and Tirap districts of Arunachal Pradesh with prevalence ratio of 280 and 277 per 1000 population respectively. In these two districts, 'Other fever' and 'short duration fever with rashes' was found to be highly prevalent and significant cases of ART infection. Lohit has 42.96 per cent of people reporting to be suffering from 'other fever' and 19.81 per cent suffering from 'short duration fever with rashes'. The possible reason for prevalence of fever may be due to low availability of health care facilities and low accessibility of SC, PHC and CHC in Tirap district of Arunachal Pradesh. While Lohit has low availability of physical healthcare services which might have led to high prevalence of acute diseases.

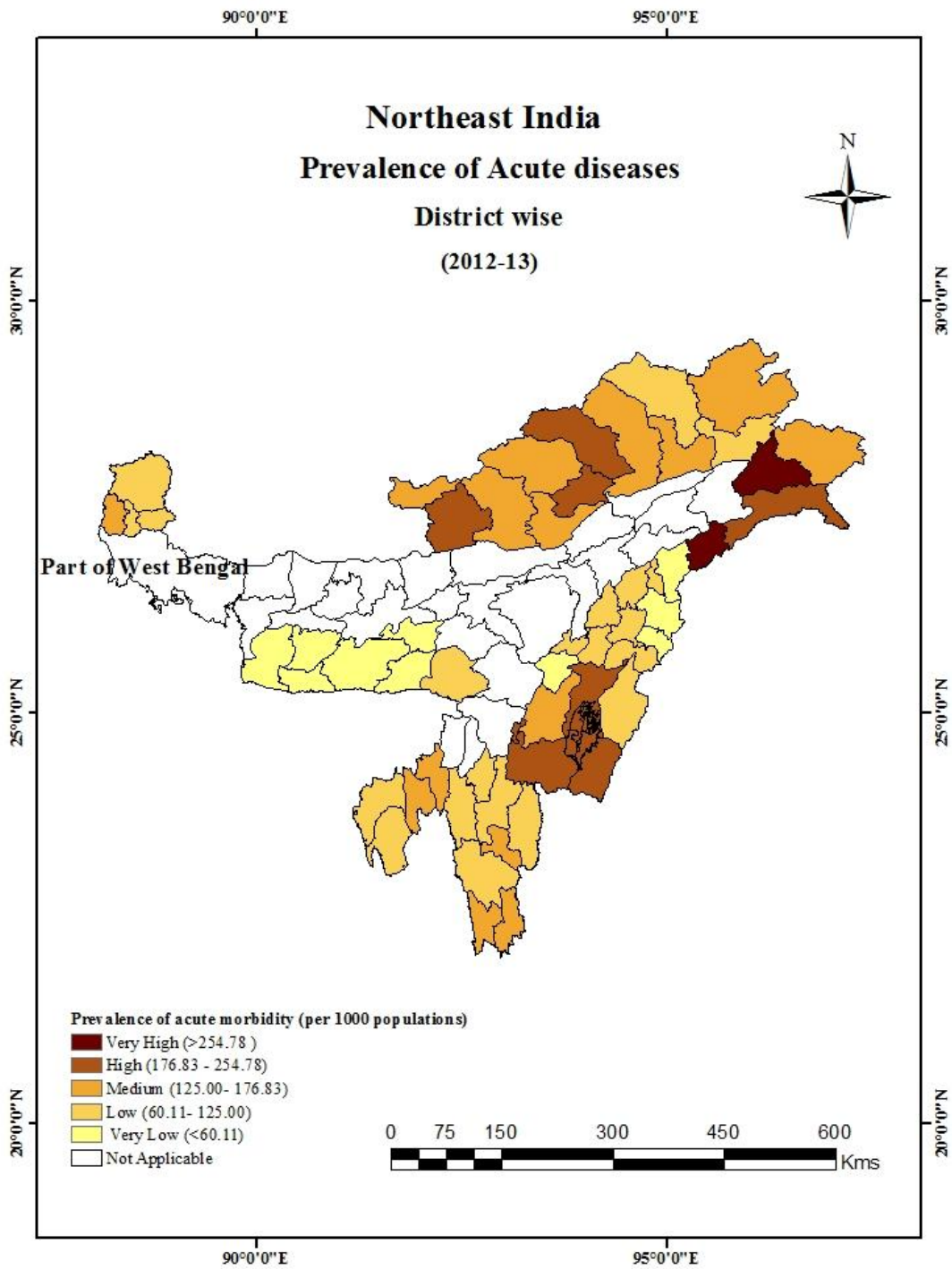
Districts like Churachandpur (249 person per 1000 population) and Senapati (232 person per 1000 population) and Bishnupur (227 person per 1000 population) etc of Manipur Changlang (201 person per 1000 population), Lower Subansiri (178 person per 1000 population), Upper Subansiri (184 person per 1000 population) etc. of Arunachal Pradesh were grouped in the high category. The high category of prevalence of acute diseases is found in districts with prevalence rate of 176 – 254 per 1000 population. Imphal west had very high occurrence of

other fever (48.15 per cent) while Churachandpur (21.99 per cent) had high occurrence of diarrhea. Arunachal Pradesh reported occurrence of 'other fever' in lower Subansiri (43.38 per cent) and Upper Subansiri (31.95 per cent). Senapati had very low availability of healthcare services.

Districts with prevalence rate of 125-177 per 1000 population were categorized in the medium category. These districts include Lawngtlai (173 per 1000 population) and Saiha (126 per 1000 population) etc. of Mizoram, Dhalai (152 per 1000 population) and North Tripura (148 per 1000 population) of Tripura, Tamenglong (147 per 1000 population) of Manipur, West districts (127 per 1000 population) of Sikkim etc. Lawngtlai had high percentage of people suffering from 'Other fever' (41.67 per cent). North Tripura and Dhalai have low healthcare facilities along with low accessibility of SC in Tamenglong (11.11 per cent). West Sikkim had medium level of availability of healthcare facilities (CI 30.78).

There are maximum numbers of districts categorized in the low category, with prevalence rate of 60-125 per 1000 population. The districts include Ukhrul (124 per 1000 population) of Manipur, North (98 per 1000 population) of Sikkim, Zunheboto (67 per 1000 population), of Nagaland, Aizawl (69 per 1000 population) of Mizoram etc. South district had high percentage people reporting illness from 'Other fever' (49.24 per cent). Aizawl (CI 68.43) and South (CI 60.84) had very high availability of health care facilities and hence low prevalence of acute illness. Ukhrul district had low availability (CI 25.40 for total healthcare facility of along with accessibility of SC (7.69 per cent). Hence, the possible explanation for low prevalence may be due to under reportage of illness.

Districts with prevalence rate less than 60 per 1000 population which included the districts of Mon (54 per 1000 population) of Nagaland, East Garo hill (54 per 1000 population), South Garo hill (5 per 1000 population) etc of Meghalaya. South Garo Hills (prevalence rate of 60 had very low percentage of people reporting 'other fever' which are 6.25 per cent respectively. East Garo Hill (CI 24.04) and Mon (CI 22.26) had low availability of health care services but very high accessibility of SC in East Garo hills (69.23 per cent), Ri Bhoi (63.33 per cent), (PHC in Mon (75 per cent). While the rest of the districts has medium availability of healthcare services with composite index ranging between 26.89- 36.34 and has medium accessibility of healthcare services. Hence, it is not the availability but the



Map 4.1 Prevalence of acute diseases across districts in Northeast India, 2012-13.

accessibility of healthcare service facilities which play an important role in reducing the occurrence of acute illness. Also, out of pocket expenditure (OOP Expenditure) was found to be negative in East Garo Hills which meant that the non-occurrence of OOP. Rather, they were surplus money provided by the schemes of the government.

Districts of South Garo Hill (5 per 1000 population) and East Khasi hill (40 per 1000 population) are found to be the best districts etc are found to be the best district due to low incidence acute illness. While Lohit and Tirap district which registered very high prevalence of acute illness coupled with low availability of healthcare services are the districts with worst outcomes.

#### **4.9 Prevalence of acute and chronic diseases across socio-economic categories**

Morbidity as reported and observed is influenced by the social-economic strata. The higher socio economic strata consist of people who are rich, powerful and affluent. Infact, “the higher an individual's income, the better his or her health”.<sup>34</sup> This is because they have better ability to pay and have better access to health care facilities. Moreover, they have better access to “material conditions which are necessary for biological survival and social participation and opportunity to control life circumstances”<sup>35</sup>. Likewise, people who are educated have higher ability to perceive diseases than those people who are less educated or less aware.<sup>36</sup> However, within this socio-economic stratum there are a number of factors which operate and determine the diseases one is exposed based upon the work environment. One’s “work practices, less stringent hygienic practices, climatic conditions, synergism between interacting parameters”<sup>37</sup> etc. determines the diseases one is affected with. Also, the physical environment one lives in determines the diseases one is at risk of being affected.

The people living in Northeast India comprises of diverse “ethno-linguistic groups comprising of 357 constitutional communities which includes 32 Scheduled Castes and 182

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<sup>34</sup>Kawachi, I. & Kennedy, B. P. (1999). Access and use if services. *Health Services Research*. 34(1), p. 215.

<sup>35</sup>Marmot, M. (2002). The Influence of income on health: Views of an Epidemiologist. *Health Affairs*, 21(2), p. 31.

<sup>36</sup> Sen, A. (2002). Health: Perception versus observation: Self reported morbidity has severe limitations and can be extremely misleading. *British Medical Journal*, 324(7342), p. 860.

<sup>37</sup> Ramanathan & Kayshap (1975), *op. cit.*, p. 62.

Scheduled Tribes”.<sup>38</sup> In fact, proportion of scheduled tribes is 23 per cent which is higher than national level of 8 per cent.<sup>39</sup> When looked at state level, the distribution of scheduled tribes is even higher in some states.

North East India an agrarian region with maximum number of workforces engaged in the primary sector. In fact many of the states are found to have higher share of workforce in the primary sector than the national level of 50 per cent. Among them, Nagaland has the highest per cent engaged in agriculture and allied activities (75.26per cent) followed by Meghalaya (74.81per cent), Assam (73per cent) etc. while the highest percentage engaged in secondary activities are found in Manipur (9.66per cent) and services, trade and commerce, transport and other tertiary activities in Mizoram (28.94per cent).<sup>40</sup>

The literacy level is quite high in Northeast India with the highest being recorded in Mizoram 91.58 per cent in 2011. Remaining states of Northeast such as Tripura (87.75 per cent), Nagaland (80.11 per cent), Manipur (79.85 per cent) etc have higher literacy rates than the all India literacy rate of 74.04 per cent.<sup>41</sup> Higher level of education means higher awareness and greater health benefits to the people. Greater attainment levels improve health through successful career, lesser economic hardship and better working conditions, socio-psychological conditions and healthy lifestyle (Ross et.al., 1995)<sup>42</sup>.

Prevalence of chronic and acute disease per 1000 populations (Table No. 4.3) is shown across social groups, educational and occupational groups. Acute diseases are found to be more prevalent across various socio-economic groups than the chronic diseases. This may be due to the nature of activities they are engaged in, due to the nutrition of the various population groups which are quite different from each other. Moreover, the climatic conditions of the region ranges from tropical and sub-tropical monsoon climate which might have created favorable conditions for acute illness like fever, diarrhoea, dysentery etc. and caused the prevalence of acute diseases more than chronic.

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<sup>38</sup>Taher, M. & Ahmed, P. (2012). Geography of North -East India (pp. 246-269). Guwahati: *Mani Manik Prakash*.

<sup>39</sup>*Ibid.*, pp. 261-262.

<sup>40</sup> Taher & Ahmed (2012), *op. cit.*, pp. 246-269.

<sup>41</sup>Census of India (2011). Retrieved from <http://www.census2011.co.in/literacy.php>

<sup>42</sup>Ross, C.E and Wu, C (1995). The Links Between Education and Health. *American Sociological Review*, 60 (5), p. 719.

Table No. 4.3 Prevalence of Chronic and acute diseases across social groups.

Socio-economic groups	Chronic Diseases	Acute Diseases
<b>Social Group</b>		
SC	62	129
ST	48	118
OBC	76	172
OTHERS	95	191
<b>Occupation</b>		
Primary	88	145
Secondary	86	124
Tertiary	98	121
<b>Education</b>		
Primary	47	79
Secondary	56	82
Graduation	65	80

Source: Calculated from DLHS - 4 (2012-13).

Amongst the social group, the Others category reported the highest prevalence of both chronic (95) and acute (191) diseases followed by the OBC having the prevalence rate of 76 per 1000 population in chronic diseases and 172 per 1000 population in acute category. It is also to be seen that the SC group has higher prevalence of both acute and chronic diseases than ST population which is in fact more in number in the Northeast highlighting the plight of the SC groups.

Those engaged were more prone to acute illness with a prevalence rate of 145 per 1000 population as compared to the tertiary group which reported the lowest (121 per 1000 population group). This may be because agricultural labour involves ‘hard day labour’<sup>43</sup> in Northeast India where there is very few level of mechanization. This coupled with poorly

<sup>43</sup> Ross and Wu (1995), *op. cit.*, p. 62.



staffed healthcare centres and lack of adequately trained personnel with low availability of medicines may have led to high prevalence of diseases.<sup>44</sup>

The secondary occupation involving the industrial workers be it small scale or medium scale or cottage industries also had the second highest prevalence rate of acute diseases at 124 per 1000 population. The main reason being unregulated work conditions of the small scale industries like bakery, food and beverage industries, dress making etc which are found in large numbers in Northeast.<sup>45</sup>

Those engaged in tertiary work also had third highest prevalence of acute diseases which may be due to the fact that geographic or environmental factors play a dominating role in Northeast than other factors. Also, this category had the highest prevalence of chronic diseases (98 per 1000 population) pointing to the relation between type of work and diseases pattern. Primary occupation has the lowest prevalence of chronic diseases (88 per 1000 population) which may be due to the manual labour involved reducing the risk of heart related diseases but attracting other chronic diseases likes TB, ARI, etc.

In the educational category, higher prevalence both in terms of chronic and acute diseases is reported in the graduate category. This means that more educated people has greater tendency to perceive and report any diseases more than the less educated people. This was illustrated by Sen (1998)<sup>46</sup> by taking the example of Kerala and Bihar. Kerala had high prevalence of self reported morbidity while Bihar had comparatively lower rate of self reported morbidity. Kerala known for highest life expectancy, highest literacy and awareness has the highest reported morbidity which runs completely against their life expectancy. Bihar known for low life expectancy and woeful state of medical facilities had the lowest self reported morbidity.

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<sup>44</sup> Ramanathan & Kayshap (1975), *op. cit.*, p. 62.

<sup>45</sup> *Ibid.*

<sup>46</sup> Sen, A. (1998). Mortality as an indicator of economic success and failure. *The Economic Journal*, 108(446), 1-25.

#### **4.10 Patterns of Chronic Diseases Prevalence**

The prevalence of chronic diseases was more in the valley region than the hilly regions with an average prevalence rate of 73 per 1000 population and 37 per 1000 populations respectively. Since valley region is more developed people are engaged more in tertiary activities and their sedentary lifestyle also induces the occurrence of chronic diseases such as heart diseases, diabetes, stroke etc. While the hilly regions known for strenuous physical activities and hard lifestyle, there is low prevalence of chronic diseases.

Coming to the state level, Manipur had the highest prevalence rate of 83 per 1000 population followed by Sikkim (63 per 1000 population) and Arunachal Pradesh (53 per 1000 populations respectively). The lowest Prevalence rate was recorded in Nagaland (14 per 1000 populations), Meghalaya (18 per 1000 populations) and Tripura (32 per 1000 populations).

##### **a. Regional**

Amongst the region, valley region in Manipur had the highest prevalence of chronic diseases with a prevalence rate of 105 per 1000 population. The main diseases were infectious and parasitic diseases (35.34 per cent), endocrine, nutritional and metabolic diseases (29.21 per cent), diseases of blood and blood forming organs and certain disorder involving immune system (29.21 per cent). This region had very low availability of healthcare services with a composite index value of 22.33 but high accessibility of healthcare facilities like SC (76.29 per cent), PHC (91.16 per cent) and CHC (96.59 per cent) and high affordability with OOP expenditure of Rs 13592. This shows that it is the low availability of health care facilities that plays a crucial role in occurrence of chronic diseases.

Hilly regions of Sikkim with Manipur and Arunachal Pradesh were grouped in the medium category with a prevalence rate of 43- 71 per 1000 population. In Sikkim diseases of circulatory system (26.25 per cent) and Arunachal Pradesh hilly regions diseases of digestive system (29.03 per cent) and others (31.47 per cent) and in Manipur diseases of blood and certain disorders involving immune system (34.75 per cent) along with endocrine, nutritional and metabolic disease (34.75 per cent) had been found to be the most prevalent. Sikkim hilly region and Arunachal Hilly region had high availability of physical healthcare services.

Table no. 4.4 Category of chronic diseases across regions.

Category	Hilly region	Valley region
Very High ( $>\mu+2SD$ ) ( $>99$ )	NA	Manipur Valley region
High ( $\mu+1SD$ to $\mu+2SD$ ) (71 to 99)	NA	NA
Medium( $\mu$ to $\mu+1SD$ ) (43 to 71)	Sikkim Hilly region, Manipur Hilly region, Arunachal Pradesh Hilly region	NA
Low ( $\mu-1SD$ to $\mu$ ) (15 to 43)	Tripura hilly region, Mizoram hilly region, Meghalaya hilly region	Tripura valley region, Nagaland valley region
Very Low ( $<\mu-1SD$ ) ( $<15$ )	Nagaland hilly region	NA

Source: Calculated from DLHS-4 (2012-13) Unit level data.

Accessibility of PHC was high in case of Sikkim ( 59.53 per cent) and medium in case of Arunachal Pradesh hilly region (45.12 per cent). This may have prevented the cause of chronic diseases to some extent and hence the medium ranking of both the regions. While Manipur hilly region had low health care services (CI of 20.45) with medium accessibility of PHC (47.10 per cent), (CHC (43.81 per cent) and high affordability (Rs 10941) which might be the reason for medium category of the region.

The hilly regions of Tripura, Mizoram, Meghalaya and the valley regions of Nagaland and Tripura were grouped in the low category. These regions had a prevalence rate of 15-43 per 1000 population. In Tripura hilly and valley region disease of digestive system (22.39 per cent in hills and 17.775 in valley) and other type of diseases (24.32 per cent in hills and 19.31 per cent in valley) were common. While Mizoram hilly region had the highest percentage of digestive system diseases with 42.88 per cent people diagnosed with it. In Meghalaya ‘other’ type of disease recorded the highest (49.9 per cent) followed by diseases of the respiratory system (18.55 per cent). Tripura hilly region had very low availability of healthcare services (CI 15.63) and Nagaland valley (CI 25.75) region has low availability of health care services.

As such the low prevalence of disease may not be due to health care availability of facilities but due to high accessibility of health care facilities. For example Tripura hilly region had high accessibility of PHC (76.52 per cent).

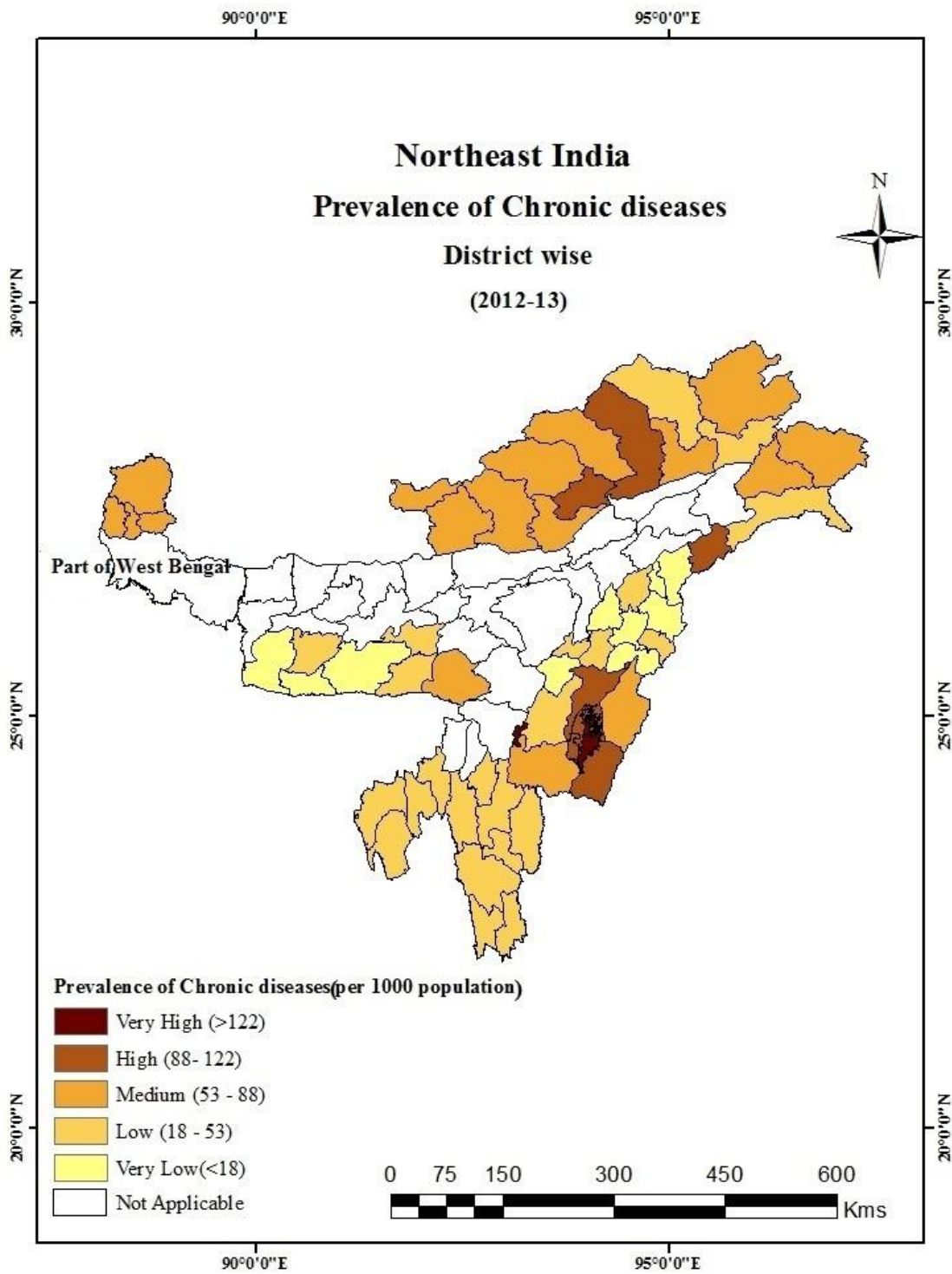
Hilly region in Nagaland occupied the very low category with prevalence of 11 chronic diseases per 1000 population. The main disease diagnosed was diseases of the digestive system (17.52 per cent). This may be due to the high availability of healthcare services (CI 26.35) in the region.

#### **b. District level**

At district level, Thoubal district has the highest prevalence (144 per 1000 population) followed by Imphal East (130 per 1000 population). Infectious and parasitic diseases (38.02 per cent) are found to be the most common disease in Thoubal. It has low availability of healthcare facilities in the region with a CI of 19.54 which might have led to low curative and preventive care in the districts and more cases of infectious and parasitic diseases in the region.

While valley districts of Manipur was categorized in the high category the like Bishnupur (121 per 1000 population) and Imphal West (97 per 1000 population) and also the hill districts like Senapati (109 per 1000 population) and Chandel (106 per 1000 population) and Lower Subansiri (103 per 1000 population) of Arunachal Pradesh had higher prevalence of Diseases which is shown in the Map 4.2. In these high category districts, Senapati district recorded highest percentage of infectious and parasitic disease and infectious diseases (40.80 per cent out of the total chronic disease).

In lower Subansiri district, endocrine, nutritional and metabolic disease (23.67 per cent) was found to be most diagnosed. All these districts had low availability of healthcare services with CI ranging from 17.44-26.89 while Chandel district had very low availability of healthcare services with a CI of 10.79. Adequacy of proper health services would have played an important role in preventing the occurrence of chronic diseases as reported above.



Map 4.2 Prevalence of Chronic diseases across districts in Northeast India, 2012-13.

Districts with a prevalence rate of 53 to 88 per 1000 occupied the medium category includes populations. The districts included the hilly districts of Papum Pare (85 per 1000) of Arunachal Pradesh, North (73 per 1000 population) of Sikkim, Ukhrul (81 per 1000 population) of district of Manipur etc. Major diseases diagnosed were diseases of the digestive system (37.39 per cent in Papum Pare district) and disease of endocrine, nutritional and metabolic diseases (35.95 per cent in Ukhrul district). Papum pare had medium availability of health care services with a CI of 30.35 which might have led to improvement in health outcome in the districts. While North and Ukhrul had low availability of healthcare services with a CI of 26.27 and 25.40 respectively.

Hilly districts such as Tuensang (19 per 1000 population) of Nagaland, Mamit (21 per 1000 population) of Mizoram, Upper Siang (22 per 1000 population) of Arunachal Pradesh etc occupied the low category with prevalence rate of 18-53 chronic diseases per 1000 populations. Diseases of the digestive system were diagnosed in highest percentage (59.60 per cent out of the total chronic diseases) in Mamit district of Mizoram. Mamit (CI 32.40) and Upper Siang (CI 31.42) had medium availability of health care services which might have aided in the prevention and cure of diseases.

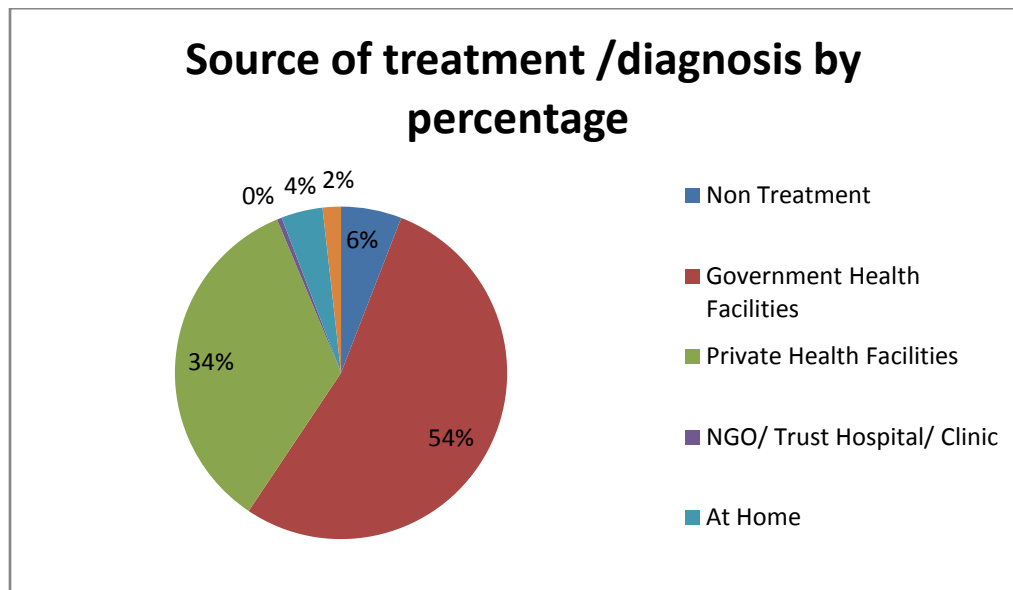
Districts with prevalence rate of less than 18 per 1000 prevalence of chronic were recorded in the very low category. The main districts were that of Phek (11 per 1000 population), South Garo Hills (5 per 1000 population), Zunheboto (8 per 1000 population) etc. It is to be noted that the hilly districts of Nagaland had the maximum number lying in the low category. Out of these districts, South Garo Hills had high percentage (73.33 per cent) of undiagnosed and unclassified diseases amongst the various diseases recorded in the state of Meghalaya. These districts had high availability of healthcare services which might have contributed to lesser cases of chronic diseases in the districts.

It is seen from above that Phek, Zunheboto and South Garo Hills had the least prevalence of chronic morbidity. Prevalence of chronic diseases was found to be high in areas where the healthcare facilities are low apart from some exceptions.

#### 4.11 Diseases by source of diagnosis

As per DLHS- 4 (2013-13) data, more number of people (54 per cent) reported the use of government facilities which include the facilities of SC, PHC, CHC, Government Dispensaries, hospitals and clinics. This may be due to the fact that rural areas of the Northeast relies more on government facilities than the private facilities.

Fig. 4.4 Chronic diseases by source of treatment, 2012-13.



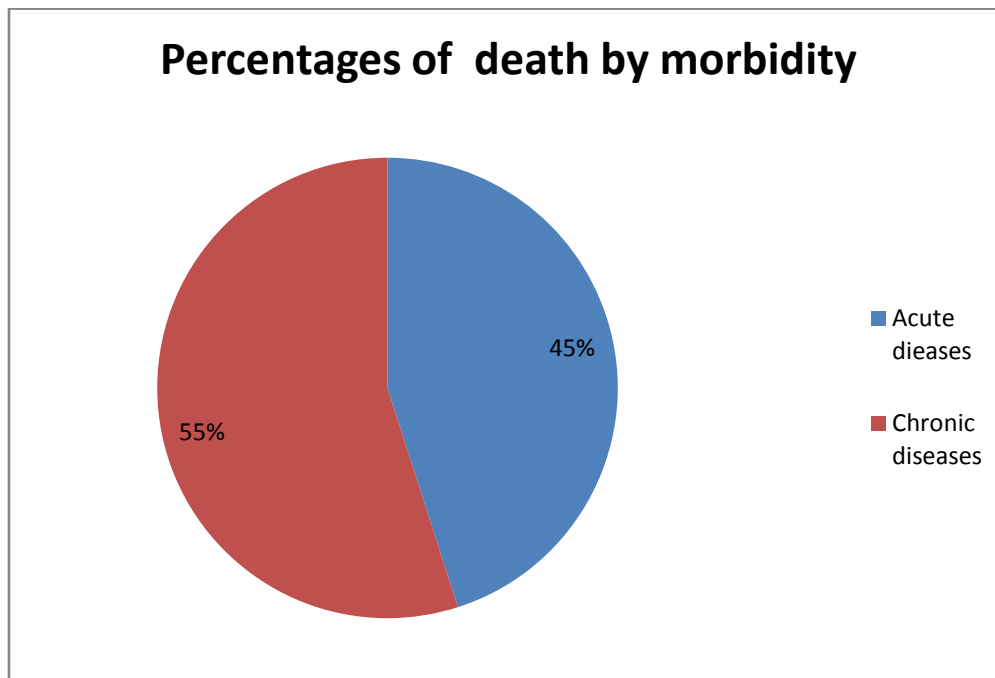
Source: Calculated from DLHS - 4 (2013-14).

The next major source of diagnosis is private healthcare facilities which include private hospitals, clinics, private ayush hospital or clinic, DOTS centre etc. While 4 per cent of the people reported treatment at home this may be due to inaccessibility or other socio-economic factors. It is found that there is no treatment or diagnosis done at NGO/ Trust Hospital or clinic in the entire region. This may be due to the absence of such organization in the region.

#### 4.12 Percentages of deaths by Morbidity types

Death can be caused by various factors ranging from nutritional deficiencies causing acute or chronic illness to accidental death like injuries, accidents etc. According to Doyal<sup>47</sup> “Over fifty per cent of childhood mortality in third world countries can be attributed to nutritional deficiencies”. Apart from this, nutritional deficiency in varied forms which may be vitamin deficiencies to protein deficiencies in diet may lead to chronic diseases in underdeveloped countries like India. The chronic diseases may eventually lead to death.

Fig No. 4.5 Death by types of morbidity in Northeast India, 2012-13.



Source: Calculated from DLHS-4 (2012-13) Unit level data.

The same is the case for acute illness. Acute illness of any form may also cause death of the individual especially in developing country like India where the burden of illness is high. The following diagram (Fig No. 4.7) gives the percentages of death by different types of morbidity.

<sup>47</sup>Doyal, L. & Pennell, I. (1994). *The Political Economy of Health* (p. 97). London: Pluto Press

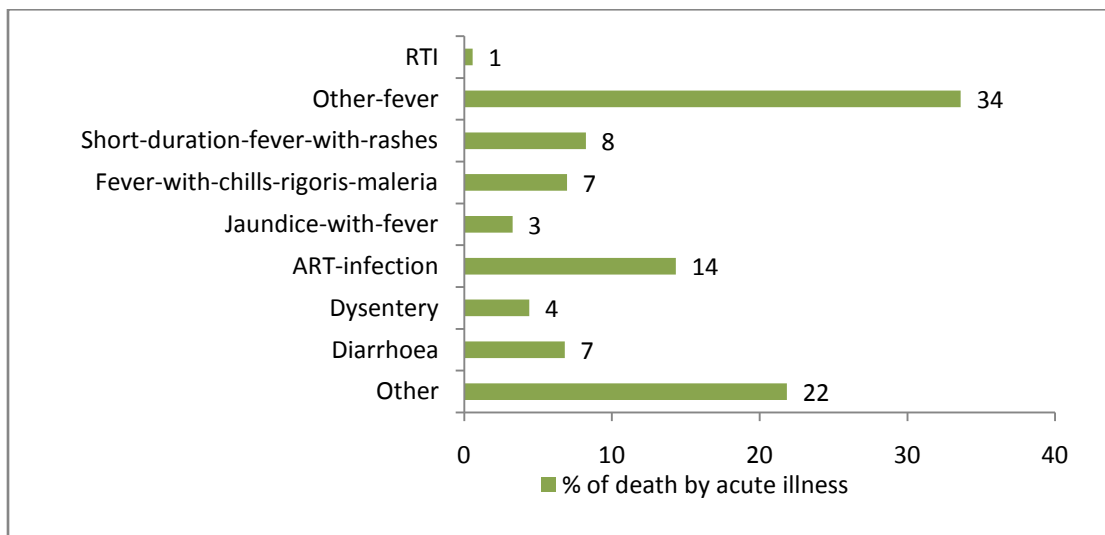


Chronic diseases accounted for 55 per cent of the deaths while acute diseases accounted for 45 per cent of the deaths in Northeast India (as shown in Fig. No. 4.6,) Death by acute diseases were mostly caused by ‘intestinal parasitic’ and ‘infectious diarrheal’ diseases in under-developed regions.<sup>48</sup> This may apply in Northeastern region which is largely under developed and topographically inaccessible. Also, the same disease may turn into chronic and debilitating disease if not given proper treatment. Here, the importance of healthcare facilities cannot be ignored.

#### 4.13 Death due to different types of acute illness.

The variable acute illness reported during last 15 days was cross tabulated with the variable ‘death’. The cross tabulation revealed that acute illness comprising of Fever with chills , rigoris and malaria, diarrhoea, short duration fever, ART-infection etc accounted for maximum deaths in Northeast India. Deaths by each type of illness have further been shown in Fig No. 4.6.

Fig No. 4.6 Deaths due to different type of acute illness in Northeast India, 2012-13.



Source: Calculated from DLHS - 4 (2012-13).

<sup>48</sup> Doyal & Pennell (1994), *op. cit.*, p. 99.

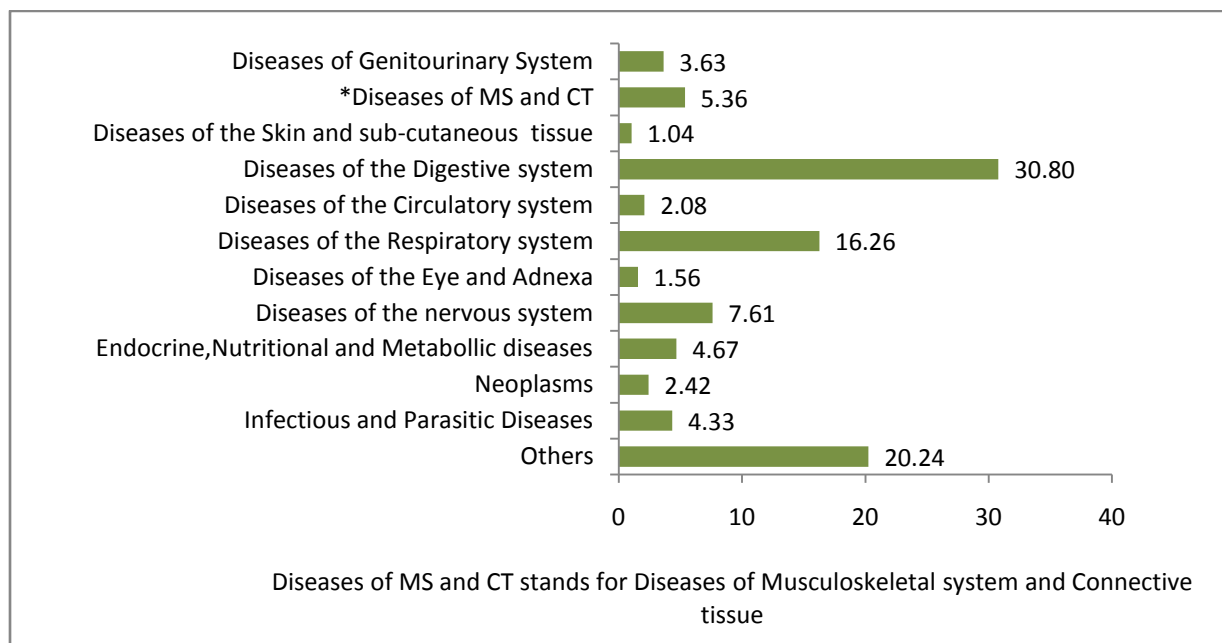
Amongst the acute illness, ‘other fever’ accounted for the highest percentage (34 per cent) of the deaths caused by acute diseases in Northeast India. However, fever as such may not be the actual killer but the symptom of major disease or infection which may not be diagnosed due to lack of awareness of various diseases, lack of medical care, lack of health facilities etc.

Other type of acute illness accounted for the second highest percentage of 22 per cent once again pointing to lack of diagnosis of death in the region. While ART-infection accounted for the third highest percentage of deaths of 14 per cent. And other minor killers include RTI and jaundice with fever.

#### 4.14 Death due to different types of chronic disease

Figure 4.8 revealed that diseases of the digestive system accounted for the highest number of deaths in the northeast. Diseases of the digestive system includes chronic liver diseases, hernia-hydrocelle-peptic ulcer etc.

Fig No. 4.7 Deaths by types of chronic diseases in Northeast India, 2012-13.



Source: Calculated from DLHS-4 (2013-14).

Meanwhile other types of diseases which were not diagnosed accounted for the second highest number of deaths with 20.24 per cent. While respiratory system disease accounted for a third highest percentage of 16.26 per cent in the entire northeast. The major killer was found to be asthma and chronic respiratory failure. Diseases of the nervous system also accounts for 7.61 per cent of the deaths in northeast. Stroke was one major killer under the diseases of the nervous system.

Diseases which accounted for the least percentage of deaths include diseases of the skin and diseases of the eye and adnexa. They accounted for 1.04 per cent and 1.56 per cent of the deaths in the northeast respectively.

#### **4.15 Proportion of deaths**

Proportion of death including all death has been taken so as to show the regional variation in the distribution of death. Proportion of death as it cannot be considered as an outcome of health however, as natural deaths are equal in the region, regional death can be taken as an outcome.

##### **a. Regional**

While comparing the Valley and Hill region, the former region had higher proportion of death with 24 persons per 1000 populations than the latter. When compared amongst the states, Mizoram reported the highest proportion of deaths (30 per 1000 populations), followed by Sikkim (27 deaths per 1000 populations) and Tripura (25 deaths per 1000 populations). Within these states, if the hills and valley regions are compared, the Mizoram hills had the highest proportion of death of 30 per 1000 populations and the Meghalaya hilly region had the lowest proportion of deaths with just 8 deaths per 1000 populations.

Maximum number of regions occupied the high category which included the Valley regions in Manipur (26 per 1000 population) regions, Tripura (25 per 1000 population) and hill regions in Tripura (25 per 1000 population). The medium category had only three regions under it which were the Valley regions in Nagaland (13per 1000 population) and Hill regions in Manipur and Nagaland.

Table No. 4.5 Category of proportion of deaths across regions.

Category	Hill region	Valley region
Very High (28 to 35) ( $\mu+1SD$ to $\mu+2SD$ )	Mizoram hilly region	NA
High (13 to 28) ( $\mu$ to $\mu+1SD$ )	Sikkim hilly region, Tripura hilly region, Arunachal Pradesh hilly region,	Manipur valley region, Tripura valley region,
Medium(13 to 21) ( $\mu-1SD$ to $\mu$ )	Manipur hilly region, Nagaland hilly region.	Nagaland valley region
Low ( $\mu-2SD$ to $\mu-1SD$ ) (6 to 13)	Meghalaya hilly region	NA

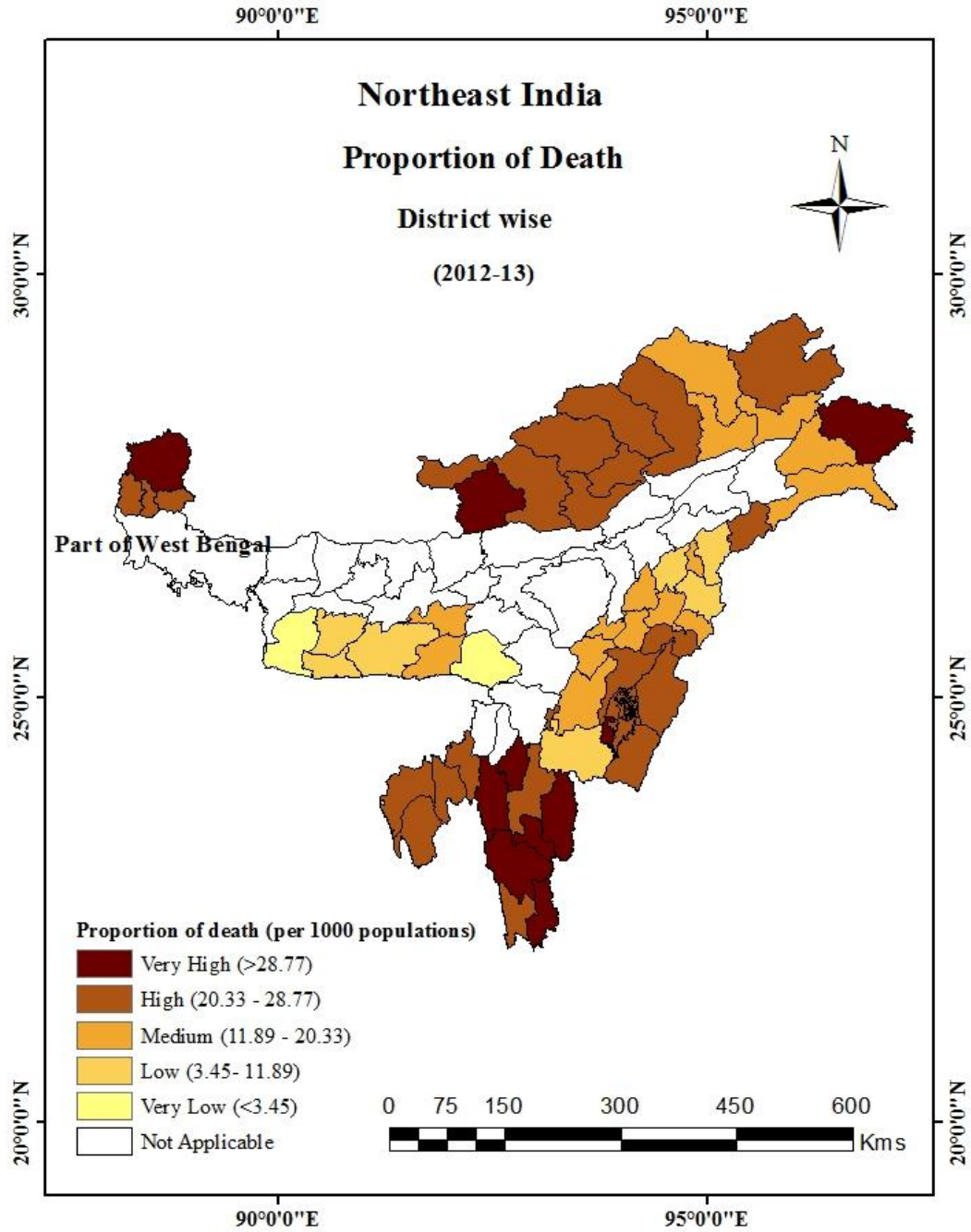
Source: Calculated from DLHS-4 (2012-13) Unit level data.

#### **b. District level**

The region wise analyses have given a deeper picture of the proportion of deaths which need to be studied further in smaller units to get a better picture of the outcome of health in the districts.

There were 10 districts in the very high category of deaths which include the districts of North district of Sikkim, Serchhip, Champhai, Anjaw etc. of Arunachal Pradesh, Bishnupur of Manipur etc. North Sikkim had the highest proportion of 36 persons per 1000 population followed by Serchhip with 35 per 1000 populations, Champhai with 34 per 1000 populations, Bishnupur with 24 deaths per 1000 populations.

Maximum numbers of districts were categorized under the high category which included West districts of Sikkim, Tawang of Arunachal Pradesh, Aizawl of Mizoram, Ukhrul of Manipur etc.



Map 4.3 Proportion of death across districts in Northeast India, 2012-13.

The highest proportion of death was found in West districts (28 per 1000 population) of Sikkim, Tawang (28 per 1000 population) of Arunachal Pradesh, Aizawl (26 per 1000 population) of Mizoram, Ukhrul (22 per 1000 population) of Manipur etc. The proportion of death ranges 20 - 29 per 1000 persons in this category.

Districts of Longleng (20 per 1000 deaths) of Nagaland, Ri Bhoi (14 per 1000 population) of Meghalaya, Tamenglong (12 per 1000) of Manipur etc. reported medium category of death which had a death proportion of 12 to 20 per 1000 populations.

South Garo Hills (12 per 1000 population) of Meghalaya, Mon (11 per 1000 population) of Nagaland, and Churachandpur (9 per 1000 population) of Manipur etc reported low category of death. Only two districts reported very low category of death which are West Garo Hills and Jaintia Hills with a death rate of less than 3 per 1000 population.

#### **4.16 Proportion of deaths across social groups**

It can be seen that amongst the social groups, ST and OBC had the highest proportions of death followed by the 'Others' group which is shown in Table No.4.5. While SC had the lowest proportion of deaths reported possibly due to the fact that SC are financially better placed than the ST's in Northeast.

Among the occupational category, people engaged in primary occupation reported the highest proportion of deaths of 36 per 1000 persons. It was followed by tertiary with 33 deaths per 1000 populations and secondary with 32 deaths per 1000 populations. This shows that there was not any variation. While the education had no bearing upon proportion of deaths in Northeast meaning there was no influence of one's education upon seeking healthcare to prevent untimely deaths.

Table no. 4.6 Proportion of deaths across socio-economic groups in Northeast.

<b>Socio-economic groups</b>	<b>Proportion of deaths across socio-economic groups</b>
<b>Social Groups</b>	
SC	12
ST	15
OBC	15
OTHERS	14
<b>Occupation</b>	
Primary	36
Secondary	32
Tertiary	33
<b>Education</b>	
Primary	15
Secondary	15
Graduation	15

Source: Calculated from DLHS - 4 (2013-14)

#### **4.17 Healthcare facilities and Outcomes**

##### **(i). Acute morbidity and availability of healthcare facilities**

Prevalence of acute diseases and composite index of availability of healthcare facilities at regional level and district level has been cross tabulated to show the associations between prevalence of acute diseases and availability of healthcare facility. At regional level, and prevalence of acute morbidity has been grouped under five categories (as both regional and district level had same category values) namely very high (with prevalence rate of 255 and more prevalence of acute diseases per 1000 population), high (177 to 255 prevalence of acute diseases per 1000 population), medium (125 to 177 prevalence of acute diseases per 1000

population), low (60 to 125 prevalence of acute diseases per 1000 population) and very low (60 prevalence of acute diseases per 1000 population).

Amongst the hill and valley regions, Valley regions of Manipur had the highest prevalence of acute diseases (217 per 1000 population) (refer to Annexure Table No.5) with low availability of healthcare facilities (CI 22.33 against the highest of CI 37.1) which showed that availability of healthcare facilities influences the prevalence of acute disease in the region. The same pattern was found in the hill regions of Tripura and Manipur which had high prevalence of acute diseases with low availability of healthcare facilities.

Mizoram hilly regions reported low prevalence of acute diseases (105 per 1000 population) while it had high availability of healthcare facilities (CI 37.1 which was the highest in the Northeast region). The same pattern was found in hilly regions of Sikkim which had low prevalence of acute diseases (99 per 1000 population) with high availability of healthcare facility (CI 36.72). The hilly region of Meghalaya had very low prevalence of acute diseases (45 per 1000 population) with medium availability of healthcare facilities (CI 30.91).

At district level analysis, two patterns had emerged; one is that the highest prevalence of acute diseases was recorded in districts with the lowest available healthcare facilities. For example, Lohit had the highest prevalence of acute diseases with 280 person ill per 1000 populations (Table No.4.7). Its' composite index value of health facilities was ranked under the low category (between 17 to 27 CI values). The same pattern was seen incase of Tirap district of Arunachal Pradesh which had the second highest prevalence of acute diseases with 277 person ill per 1000 populations.

The same pattern was reflected in all the districts ranking under high prevalence of healthcare facilities like Senapati, Thoubal, Chandel, Lawngtlai etc. Senapati had prevalence of 232 acute diseases per 1000 population with a CI of 14.53 which was very low in terms of availability of healthcare facilities. Thoubal had 228 cases of acute diseases per 1000 population with a CI value of 19.54.

The districts which were categorized in the medium category acute diseases had low availability of healthcare facilities. For example, Lawngtlai district of Mizoram which had low availability of healthcare facility with a CI of 21 had medium prevalence of acute



Table No. 4.7 Prevalence of Acute diseases and Health Index across districts.

P r e v a l e n c e  o f  A c u t e  D i s e a s e a c c r o s s D i s t r i c t s	Category of Districts with availability of healthcare facilities					
	<b>Acute Diseases prevalence per 1000 category</b>	<b>Very Low ( 17.44 and below)</b>	<b>Low (17.44 to 26.89)</b>	<b>Medium (26.89 to 36.34)</b>	<b>High (36.34 to 45.79)</b>	<b>Very High (45.79 and above)</b>
	Very High (255 and above)	Tirap	Lohit	Churachandpur	N.A.	N.A.
	High (176 to 255)	Senapati, Chandel	Imphal west, Thoubal, Bishnupur, Changlang, W. Kameng, Upper Subansiri	Imphal East, Lower Subansiri	N.A.	N.A.
	Medium ( 125 to 177)	Dhalai, North Tripura,	Lawngtlai, West Siang, Kurung Kumey, Tamenglong , Saiha	East Kameng, East Siang, Anjaw, Papum Pare, Tawang, Dibang Valley, West District,	N.A.	Serchhip
	Low (60 to 125)	N.A.	Ukhrul, Lower Dibang Valley, North district, Wokha, South Tripura, Zunheboto,	Kolasib, Upper Siang, Lunglai, Dimapur, West Tripura, Mamit, Mokokchung, East District	Kohima, Champhai	South District, Jaintia Hills, Aizawl,
	Very Low ( 60 and below)	N.A.	Tuensang, East Garo Hills, Ri Bhoi, Mon, West Garo Hills, Kiphire, East Khasi Hills	N.A.	Peren, West Khasi Hills	South Garo Hills

Source: Calculated from DLHS -4(2012-13) Unit level Data. N.A.: Not Applicable.

diseases (173 per 1000 population). The same case was found in North Tripura, Saiha, Tawang. In some districts which had high availability of healthcare facilities had low prevalence of acute diseases like Aizawl which had the highest availability of healthcare facilities (CI 68.43) and low prevalence of acute diseases (69 per 1000 population). The same can be said for South district of Sikkim which had high availability of healthcare facilities (CI 60.84) with low prevalence of acute diseases (98 per 1000 population).

In districts like South Tripura, Dimapur, Wokha etc. the availability of healthcare facilities were low as well the prevalence of acute diseases. This shows that morbidity is not only determined by the availability of healthcare facilities but also due to other factors like socio-economic which needs to be studied.

Among those districts which occupied the very low category in terms of prevalence of acute illness, West Khasi hill district and Peren had high availability of healthcare facility. West Khasi hill had a prevalence rate of 44 per 1000 population with CI of 38.50 while Peren had 51 cases of acute diseases per 1000 population with a CI value of healthcare facilities of 37.22. Thus, it can be said that healthcare facilities to some extent influence the prevalence of acute diseases in the region apart from some exceptional cases. However, this does not mean that availability of healthcare facilities are the only factor affecting health outcomes, other factors also need to be investigated.

#### **(ii) Chronic morbidity and availability of healthcare facilities**

Prevalence of chronic disease has been categorized into five categories: very high (28 to 35 per 1000 populations) above), high (13 to 28 per 1000 populations), medium (13 to 21 per 1000 populations) and low (6 to 13 per 1000 populations) Composite index of healthcare available has also been categorized into four categories: high (CI 32.42 to 38.83), medium (CI 26.01 to 32.42), low (CI 26.89 to 36.34), (CI 17.44 to 26.89) and very low (CI 17.44 and below).

At regional level, Valley regions of Manipur had very high prevalence of chronic diseases (105 per 1000 populations) while it had low availability of healthcare facilities (CI 22) (refer to Annexure Table No.6). The same pattern was observed in hilly regions of Manipur which had low availability of healthcare facilities (CI 20.45) while hilly region in Sikkim had high

prevalence of chronic diseases despite high availability of healthcare facilities (CI36.72). Only one region i.e., hilly region of Nagaland had low prevalence of chronic diseases (11 per 1000 population) with medium level of availability of healthcare facilities (CI 26.35).

For district level analysis, prevalence of chronic disease has also been categorized into five categories: very high (122 and above), high (87 to 122), medium (18 to 53), low (18 to 53) and very low (18 and below). Composite index of healthcare available has also been categorized into five categories: very high (45.79 and above), high (36.34 to 45.79), medium (26.89 to 36.34), low (17.44 to 26.89) and very low (17.44 and below) (Table No. 4.8).

High prevalence of chronic diseases had been found to be associated with chronic diseases with low availability of healthcare facilities as in the case of Thoubal and Imphal East. Thoubal had low availability of healthcare facilities with a composite index value of 19.54 with the highest prevalence of chronic diseases of 144 per 1000 population.

The same goes for districts with high prevalence of chronic morbidity like Chandel, Tirap, Senapati, West Siang etc. Chandel had high prevalence rate of 106 cases of chronic disease per 1000 population with a CI of just 10.79. This shows that availability of healthcare facilities influence the incidence of diseases to some extent.

Some district like South district of Sikkim which had very high availability of healthcare facilities (60.84 CI) had medium prevalence of chronic diseases (58 per 1000 population). However, the link between availability of healthcare facilities and prevalence of chronic diseases are once again exhibited in the low category of prevalence. For example, Aizawl which had high availability of healthcare facilities (CI 68. 43) had low prevalence of chronic diseases (37 cases per 1000 population). Thus, availability of healthcare facilities are associated with lesser prevalence of chronic diseases.

Table No. 4.8 Prevalence of Chronic diseases and Health Index.

P r e v a l e n c e  o f  C h r o n i c  D i s e a s e s	Chronic Diseases prevalence per 1000 category	Category of Districts with availability of healthcare facilities				
		Very Low(17.44 and below)	Low (17.44 to 26.89)	Medium(26.89 to 36.34)	High(36.34 to 45.79)	Very High (45.79 and above)
	Very High (122 and above)	NA	Thoubal	Imphal East	N.A.	N.A.
	High (88 to 122)	Senapati, Chandel, Tirap	West Siang, Lower Subansiri, Imphal West, Bishnupur	N.A.	N.A.	N.A.
	Medium (53 to 88)	N.A.	Ukhrul, West Kameng, Lohit, North, Upper Subansiri, Kurung Kumey	Papum Pare, Tawang, West District, Saiha, Churachandpur, Dibang Valley, East Kameng, East Siang, Anjaw	NA	South, Jaintia Hills
	Low (18 to 53)	Dhalai, North Tripura,	South Tripura, Tamenglong, Dimapur, Changlang, Lawngtlai, East Garo Hills, East Khasi Hills, Lower Dibang Valley, Ri Bhoi, Mokokchung, Saiha, Tuensang, Wokha, Mon,	Kohima, Kolasib, West Tripura, Lunglai, Upper Siang, Mamit	Champhai, West Khasi Hill, Peren, Phek	Aizawl, Serchhip
Very Low (18 and below)	N.A.	West Garo Hills, Longleng, Zunheboto, Kiphire		South Garo Hills	N.A.	

Source: Calculated from DLHS -4(2012-13) Unit level Data. N.A.: Not Applicable.

### **(iii) Proportion of death and availability of healthcare facilities**

Proportion of death cannot be directly linked with availability of health care facilities as the present data also includes natural death. Rather, the study is an attempt to find some kind of association between healthcare facilities and proportion of death.

Analysis of proportion of death with healthcare facilities has been done by cross tabulation of proportion of deaths with availability of healthcare facilities. The region wise proportion of death has been grouped under four categories: Very high (28 to 35 deaths per 1000 populations), high (13 to 28 deaths per 1000 populations), medium (13 to 21 deaths per 1000 populations) and low (6 to 13 deaths per 1000 populations). Regional level analysis showed that hilly region of Mizoram occupied the very high category of proportion of deaths (30 per 1000) as well as very high availability of healthcare facilities (CI 37.1) which shows that there is no association between proportion of deaths and availability of healthcare facilities in case of hilly region of Mizoram (Refer to Annexure Table no. 7). However, regions like hilly regions of Manipur and Tripura had high proportion of deaths with low availability of healthcare facilities. This shows that rather than the availability of healthcare facilities, it is the regional factors dominating the outcome of health. Hilly regions of Meghalaya occupied the low category of proportion of deaths (8 deaths per 1000 population) which might be due to the low availability of healthcare facilities (CI 30.91). For deeper understanding, district level analysis has been given below.

At district level, there is no clear association between availability of healthcare facilities and occurrence of death. This pattern was found in the very high category of proportion of deaths. Out of the 10 districts in the very high category, four had low availability of healthcare facilities and high cases of death. For example, North district had high proportion of deaths (36 per 1000 population) and low availability of healthcare

Table No. 4.9 Proportion of deaths and healthcare facility index across districts.

P r o p o r t i o n o f D e a t h s a c r o s s D i s t r i c t s	Proportion of death per 1000 category	Category of Districts with availability of healthcare facilities				
		Very Low(17.44 and below)	Low (17.44 to 26.89)	Medium(26.89 to 36.34)	High (36.34 to 45.79)	Very High (45.79 and above)
	Very High (29 and above)	N.A.	North, Saiha	Anjaw, Kolasib, West Kameng, Mimit, Bishnupur, Lunglai	Champhai	Serchhip
	High (20 to 29)	Dhalai, Tirap, North Tripura, Chandel, Senapati	Kurung Kumey, Thoubal, Upper Subansiri, Imphal West, South Tripura, West Siang, Ukhrul, Lower Subansiri, Lawngtlai	West, Tawang, Imphal East, East Kameng, West Tripura, East, Dibang Valley, Papum Pare	Phek	Aizawl, South
	Medium(12 to 20)	Changlang	Longleng, Lohit, Lower Dibang Valley, Ri Bhoi, E.K. Hills, Wokha, Tuensang, Zunheboto, Dimapur, Tamenglong	East Siang, Kohima, Upper Siang	Peren,	N.A.
	Low (3 to 12)	N.A.	Mon, Kiphire, East Garo Hills	Mokokchung, Churachandpur	South Garo Hills, West Khasi Hills	N.A.
Very Low (3 and below)	N.A.	West Garo Hills	N.A.	N.A.	Jaintia Hills	

Source: Calculated from DLHS -4(2012-13) Unit level Data.N.A.: Not Applicable.

facilities (CI 26.27). The rest of the districts had either medium or high availability of healthcare facilities and high proportion of death.

There were seven districts in the high category out of 12 which had low availability of healthcare facilities and high occurrence of death. Some of the districts were Dhalai (CI 15.37 and proportion of death 28 per 1000 populations), Tirap (CI 16.26 with 25 cases of death per 1000 population etc).

The pattern of low availability of healthcare facilities and medium occurrence of death is found in the districts of Longleng (CI 17.83 Proportion of death 19 per 1000 populations), Wokha (CI 23.50 with proportion of death of 13 per 1000 populations). Districts like East Garo hill and Kiphire had low availability of healthcare facilities with a CI of 26.04 and 19.4 respectively.

The proportion of death was 10 persons per 1000 population and 24 persons per 1000 population for East Garo hill and Kiphire respectively. The proportion of death was found to be associated with availability of healthcare facilities in two districts i.e., Jaintia hill which had less than 3 cases of death per 1000 population with high availability of healthcare facilities with a CI of 46.28. However, this result can be taken as completely reflecting the efficiency of healthcare system but can also be the case of under reporting.

**(iv) Regression between availability, accessibility, affordability of healthcare and socio-economic variable.**

Multivariate linear regression model is chosen to test role of different factors upon outcome. Apart from the variables associated with healthcare services, socio-economic variables such as social groups, persons engaged in different occupation group, level of education etc are taken.

**Model 1 Multivariate linear regression with acute illness as dependent variable.**

In the first model, prevalence of acute diseases in the last 15 days has been taken as dependent variable and variables like availability of healthcare services, accessibility of healthcare services, and affordability of healthcare services. From socio-economic variables Scheduled tribe population, persons engaged in primary occupations,

graduate/B.B.A/B.Tech/MBBS/equivalent as independent variables. These particular socio-economic variables have been chosen as they are found to be the most significant in the regression test.

From Table No. 4.6, it can be seen that the independent variables taken is able to explain the prevalence of acute diseases by 55.3 per cent. The value of co-efficient shows that scheduled Tribe has negative relation with prevalence of acute diseases. With one unit increased in number of ST population, the prevalence of acute diseases will decrease by 0.017 per cent which can only be explained by traditional method of healing and healthy, nutritional diets of the scheduled tribe population in Northeast India. This can also be due to under reporting of acute illness amongst the ST population due to low perceptibility of illness. While there is positive relation of those belonging to the primary occupational category and prevalence of acute diseases indicating that with one unit increase in the person engaged in primary occupation, prevalence of acute disease will increase by 0.148 percent.

Table No. 4.10 Multivariate linear regression between acute diseases and healthcare availability, accessibility, affordability and across socio-economic groups.

<b>Independent variables</b>	<b>Coefficient values</b>
<b>Socio-economic variables</b>	
Scheduled Tribe	-0.017*
Primary Occupation	0.148*
Graduate/B.B.A/B.Tech/MBBS /equivalent	0.105**
<b>Healthcare services</b>	
Availability of healthcare services	-2.346*
Accessibility of healthcare services	3.268**
Affordability of healthcare services	.206
R-square	0.553

Source: Calculated from DLHS -4 (2013-14). Dependent variable: Acute illness during last 15 days. \*and \*\*implies significance level at 1 per cent and 5 per cent respectively.



Also, there is positive relation between the sections of population who are either graduate B.B.A/B.Tech/MBBS /equivalent. This means that the level of education one attains has no bearing upon morbidity prevalence. Rather, it increases by 0.105 per cent showing the vulnerability of these sections of population to acute diseases. The reason for this needs further research and investigation.

In terms of healthcare services, it has been found that availability of healthcare services has negative relation with the prevalence of acute diseases. This can be interpreted as one unit increase in availability of healthcare services will lead to 2.346 per cent decrease of prevalence of acute diseases. While accessibility of healthcare services has positive relation with prevalence of acute diseases showing that increase accessibility will have no impact upon reducing the prevalence of acute diseases. The reason behind this needs to be studied in further research. At the same time affordability of healthcare services has no relation with prevalence of acute diseases which may be due to the fact that public healthcare like SC, PHC, CHC, DH etc. are largely inexpensive as most of the cost for treatment are provided by government.

### **Model 2 Multivariate linear regression with chronic diseases as dependent variable.**

In model 2, Scheduled tribe population, persons engaged in primary occupations, graduate/B.B.A/B.Tech/MBBS /equivalent are taken as independent variables and prevalence of chronic diseases during last 1 year as dependent variable. The R-square value of 44.9 per cent shows that the independent variables explain the dependent variable by 44.9 per cent.

From table 4.5 a show that belonging to a particular social group like ST does not increase the prevalence of chronic diseases rather decreases by 0.08 per cent. This clearly shows the need to study the lifestyle and nutrition of this particular group of population. While engaging in primary occupation does increase the prevalence of chronic diseases by 0.37 per cent. This may be due to the hard labour involved in primary occupation and the associated chronic diseases.

Also, the positive relation between being graduate and occurrence of chronic diseases shows that with one unit increase in number of people who have completed graduation, there will be

0.07 per cent increase in occurrence of chronic diseases. This may be due to the sedentary of the work as one goes from primary to higher education.

Table No. 4.11 Multivariate linear regression between chronic diseases and healthcare availability, accessibility, affordability and across socio-economic groups.

<b>Independent variables</b>	<b>Coefficient values</b>
<b>Socio-economic variables</b>	
Scheduled Tribe	-0.008**
Primary Occupation	0.037**
Graduate/B.B.A/B.Tech/MBBS /equivalent	0.075**
<b>Healthcare services</b>	
Availability of healthcare services	-0.759**
Accessibility of healthcare services	1.544**
Affordability of healthcare services	0.458
R- square	0.449

Source: Calculated from DLHS-4 (2013-14).\*and \*\* implies significance level at 1 per cent and 5 per cent respectively.

The availability of healthcare services shows that availability of healthcare services has negative relation with occurrence of chronic diseases. This means one unit increase in infrastructure will decrease the occurrence of chronic diseases by -0.759. While increasing accessibility in terms of distance does not mean there will be lesser occurrence of diseases. Lastly, the variable affordability has been found to be not significant.

#### **4.18 Conclusion**

The present chapter dealt with acute and chronic diseases and proportion of death as proxy variables for outcome of healthcare system. Among the two types of morbidity, acute diseases had been found to be the most prevalent in Northeast India with 70 per cent of the diseases reported by DLHS-4 (2012-13) being comprised by acute diseases. The rest 30 per cent is comprised by chronic diseases. The major acute disease reported being ‘Other-fever’ making up 35.34 per cent of the acute diseases being reported in Northeast India. While

proportion of death was found to be the highest in Valley region (24 per thousand) among which Manipur valley had the highest while Meghalaya hilly region had the least. Among districts, North Sikkim had the highest and South Garo Hills had the lowest. Among the population group, ST (15 per thousand) and OBC (15 per thousand) recorded the highest death. Primary occupation registered the highest death among the occupational group with 36 deaths per 1000 population.

Analysis of morbidity, proportion of deaths and availability of healthcare facility showed the existence of some association between availability of healthcare facilities and prevalence of morbidity both acute and chronic diseases. Districts with highest availability of healthcare facilities had low prevalence of acute and chronic diseases. The same pattern was found in proportion of death of districts with high facilities reporting lesser cases of death.

Availability of healthcare facility had been to be negatively related with morbidity. So, increase in availability of healthcare facilities will lead to decrease in morbidity in the regions. Also, accessibility of healthcare services, socio-economic indicators were found to be statistically significant with health care outcomes such as prevalence of acute diseases, prevalence of chronic diseases. But, affordability of healthcare services is not statistically significant with outcome of health. So, to affectively control the prevalence of acute morbidity and chronic morbidity in Northeast India healthcare services need to be provided adequately. However, the role of the social group one belongs to, the occupation one engaged in and the education attained cannot be ignored.

## Chapter – 5

### Summary and Conclusions

The present study highlights the existing inequalities in healthcare services and outcomes in stage process. First part of the study dealt with the regional analysis where northeast as a whole was divided into two major regions: the hill and valley regions. These two regions were further sub-divided into 12 major hill and valley regions of each state in Northeast. The healthcare services have been studied as factors influencing the outcome of healthcare. Prevalence of morbidity and proportion of deaths was taken as indirect measures of good health. Healthcare services are not the only factors influencing the healthcare outcomes. It is to a large extent determined by the socio-economic factors like housing, education, class, caste, access to amenities, employment status etc. The possible roles of these factors have been accounted in the study to the utmost possible level. Regression analyses conducted have shown the possible association of these factors.

The seventh five year plan of India recommended envisaged healthcare services to be ‘widely available, accessible to everyone and affordable by the people’ in 1985.<sup>387</sup> This vision is still an unrealized dream for India. This is still a goal to be obtained as the recent National Health policy (2017)<sup>388</sup> have outlined ‘accessible, affordable’ healthcare as part of the objectives of Universal Health Coverage. The goals and objectives of the policy makers in India still acknowledge the need to achieve the unachieved targets of 1985 and has continued with the efforts to achieve it. Also, the NHP (2017) emphasized the need to reduce the burden of non-communicable diseases. To achieve this goal of Universal Health coverage which is also a goal of WHO (2013)<sup>389</sup>, the availability of healthcare facilities and its accessibility, affordability in topographically inaccessible region of Northeast India is studied. Following conclusions have been drawn:

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<sup>387</sup>Planning Commission (1992). *Seventh Five Year Plan (1985-90)*. New Delhi: Government of India .Retrieved from

<http://planningcommission.gov.in/plans/planrel/fiveyr/welcome.html>

<sup>388</sup>Ministry of Health and Family Welfare (2017). *National Health Policy of India*. New Delhi: Government of India.

- The norms of population coverage had been reduced from 40,000 per Primary unit as recommended by Bhore Committee (1946)<sup>390</sup> to 20,000 per primary health centres in hilly/ tribal regions and 30,000 in plain/valley region. However, the ground reality is quite different from the norms being outlined in policies and guidelines. The present study shows that the valley regions are facing shortage of SC and PHC while CHC are still adequate if the IPHS (2007) population coverage is taken into consideration. Hilly region has adequate numbers of SC but shortage of PHC and CHC. Meghalaya hilly region has high pressure on SC with 6743 person being served per SC. The lowest pressure on SC is found in Arunachal Pradesh hilly region which served 1627 person per SC. Amongst the hilly region, the inequality is found to be high in terms of average person covered per SC while it is very high in PHC and CHC. This shows that despite initiatives being taken since the seventh five year plan (1985-90), remain to be achieved in the most basic form of providing the most fundamental health care facility.
- In terms of PHC, most of the hilly regions in Northeast India have below 20,000 populations per PHC which shows adequacy of PHC facility in Hilly regions of Northeast India except in the hilly regions of Meghalaya and Tripura. In these two regions, high population coverage per PHC remains the reality which shows that the facility is still inadequate in the respective regions.
- The average population covered per CHC, is below the prescribed norm of 80,000 per CHC in all the hilly regions of Northeast India. The low population density in states like Arunachal Pradesh which has just 17 person/kms as per Census of India (2011) makes number favorable. However, area should be taken into account in showing low density regions. Moreover, due to absence of proper road and transport facilities, the facility of CHC may not be accessible to the people at large. So, the population norms of IPHS (2007) may not be truly applicable in Northeast India. Rather, focus should be upon creating awareness of the need of healthcare through health education as envisioned in Bhore Committee (1946).

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<sup>389</sup> The WHO Report (2013). *Research for Universal Health Coverage*. Geneva: World Health Organization.

<sup>390</sup> Bhore Committee (1946). *Health survey and development committee* (Volume II, p. 39). Government of India, *The Manager of publications*.

- In the Valley region, there is shortage of facilities of SC as all the regions have population coverage above the 5000 norm except for Valley region of Tripura. Seemingly, Tripura has focused on creation of SC. Inequality in terms of average population covered per SC is low with a co-efficient of variation value of 20. The average populations covered by PHC in valley regions are lesser than the 30,000 population norm. But inequality in average person covered per PHC is found to be high with a CV of 47. The same goes for average person covered under CHC which is found to be highly unequal as highly populated like the Valley regions of Assam has shortage of CHC with 199 CHC serving about 1,23,444 persons per CHC. Valley region of Nagaland had the lowest population served per CHC of the regions like have low coverage with two CHC serving 25,289 persons each.
- A deeper district level analysis reveals that Lawngtlai of Mizoram has the highest number of person served by each SC with 16 SC serving 11,569 population per SC which above the norm of 3000 for a hilly region. At the same time, there is adequate facility of SC available at Tuensang of Nagaland with 17 SC serving 2303 person each. Also, the valley districts of Manipur fall in high category while the South Tripura has low coverage. Due to such variation, the inequality in terms of average person covered by SC is high amongst the districts of NER.
- In terms of PHC's, Valley region of Tripura had the lowest number of PHC facility with 20 PHC serving 34251 person each while the Valley region of Nagaland had the highest number of PHC facility with each PHC serving 8032 population each which is below the norm of 30,000 population for a valley region.
- Districts level analysis showed that Cachar and West Tripura had with 50,176 and 40186 population served by each PHC respectively which is above the norm of 30,000 per PHC in valley regions. There was very high inequality in the entire northeast in availability of PHC in the Northeastern region. As for CHC, there is very high inequality at district level as majority of the districts does not have proper facilities at CHC while only five districts have adequate facilities. The same pattern of high inequality was reflected in state wise availability of health facilities.

The analysis of regional level facilities at SC level showed the existence of high inequality amongst the hill and valley regions. Hilly region in Sikkim has very high availability of essential facilities like water supply (91.92 per cent), toilet (96.68 per cent) facility and labor room facility (98.32 per cent). Hilly region in Manipur had very low (CI 0.90 as compared to average CI of 4) availability of facilities with zero per cent availability of electricity, 14.28 per cent availability of labour room facility. At district level, the East district of Sikkim had very high availability of healthcare facilities like 100 per cent availability of water supply, toilet facility and labour room. Senapati district in Manipur had the lowest availability of healthcare facilities at SC with zero per cent availability of water supply and labour room facility. There exists high inequality of healthcare facilities at district level.

- The Mudaliar Committee (1962) recommended for residential quarter to be provided at PHC along with 10 beds including two beds for emergency case. The present study found that 77 per cent PHC had adequate availability of residential quarter but poor availability of power supply as only 44 per cent PHC had poor supply. Power supply needs to be increased so as to ensure the proper functioning of the healthcare facilities. Moreover, instead of implementing the recommendation of 10 beds per PHC (IPHS, 2007), the present norm have been diluted to only four to six beds per PHC. If the norms have been diluted to meet the shortages of availability of bed facility, the actual availability may not meet the actual requirements of the population as the present population had grown multiple times as compared to the then population in 1960's. Moreover, if the current norm is adjusted according to the current state of availability of healthcare facility, then the performance of the facility will be positive.
- Amongst the regions, Hilly regions in Sikkim had highest availability of facilities like 100 per cent availability of resident quarter, 95 per cent availability of four bed facility. This may be because of the economic development of the state like Sikkim and not the physiographic factor as assumed. Availability of residential quarter will ensure that the doctors posted at PHC are staying at their place of posting which lead to providing of healthcare services effectively while. Hilly region in Manipur had once again had low availability of facilities at PHC which had only 6 per cent regular power supply and 15.26 per cent functional vehicle. The poor infrastructure may be

the product of interplay of various factors such as rough topography posing hindrance to power supply coupled with corruption in ensuring development in the region. The level of inequality was found to be of medium level at both regional and district level with CV of 33.7 and 37.61 respectively.

- At district level, facilities such as residential quarter, functional vehicle, four bed facilities etc are very high in hilly districts such as Changlang and South Garo Hills. These two districts had 100 per cent availability of residential quarter, functional vehicle, and four bed facilities. Among the districts, Upper Subansiri had the lowest availability of facilities as there is no availability of power supply, functional vehicle, four beds and condition of residential quarter PHC.
- As for CHC, facilities of operation theatre and blood storage were found to be higher in valley region than the hilly region. The highest was found in Hilly region of Mizoram which had 87.5 per cent availability of operation theatre at existing CHC facility while Sikkim and Tripura hilly region had the lowest with no facility of operation theatre or blood storage. The level of inequality was found to be very high between the regions. At district level majority of the districts such as Senapati, Bongaigon, West Garo hill etc were grouped under the very low category. These districts had no facilities of functional operation theatre, blood storage facility at CHC. Only one district (Serchhip of Mizoram) had very high availability of facilities at CHC with 100 per cent availability of operation theatre, new born care centre along with blood storage facility. In terms of inequality, there exists very high inequality amongst the districts and state.
- At district hospital, Valley region in Tripura and Sikkim had high availability of physical healthcare services with 100 per cent availability of ultrasound facility and 75 to 100 per cent availability of critical care facility. Tripura hilly region had the lowest availability of healthcare facility with no availability of ultrasound or critical care facility. There was high inequality among the regions and districts in terms of availability of facilities at DH.
- Availability of human resources is very crucial for providing quality services to patients. Among the regions, Hilly region in Sikkim had high availability of human resources like ANM (88.75 per cent) and MHW (85.83 per cent). While availability



of human resources are very low in Hilly region of Manipur with no availability of MHW in the region. At regional level, the inequality in availability of human resources is low. At district level, inequality in availability of human resources is in medium range at SC. Among the districts, East district of Sikkim had the highest with 93.8 per cent availability of ANM and MHW while Dibang Valley the lowest availability of human resources with no availability of MHW at SC.

- At PHC, the regions which had availability of human resource include Valley regions in Manipur and Tripura which high availability of Lady MO and Pharmacists ranging from 80 to 100 per cent while Hilly region in Arunachal Pradesh had very low availability of human resources with 19.52 per cent availability of Lady Mo and 27.82 per cent availability of pharmacists. At district level, very high availability is found in Imphal West and West Tripura while very low availability is found in Dibang Valley, Lower Dibang Valley etc. The inequality in availability of human resources is found to be high at regional level and medium range in district level.
- The human resources available at CHC like the gynecologists/obstetricians, pediatricians are important for providing specialist care. However, there was very low availability of human resources example only 8.87 per cent CHC had Gynecologists/obstetricians, only 8 per cent CHC had pediatrician and only 8.51 per cent CHC had Anesthetists in Northeast region which reflects the poor condition of the CHC in the region. Among the regions, hilly regions in Meghalaya and Sikkim had relatively high availability of human resources while Hilly region in Tripura and Valley region in Nagaland had low availability. Tripura hilly region had shortage of human resources like that of specialists at CHC. While at district level, Aizawl had very high availability and districts like Tawang, Mon, Mamit etc. had no specialist in the entire district. Thus, the availability of human resources are highly unequal at regional and districts level.
- At District hospital, the human resources were found to be the highest in Hilly regions in Sikkim which had the highest availability of pediatrician while Valley regions in Manipur have very low availability of human resources. There was high level of inequality in the 12 major regions of hills and valleys. At district level, Papum Pare had the highest availability of human resources while a majority of 64

districts were grouped under the low category. At district level too, there was very high inequality in the availability of human resources.

- In terms of total physical healthcare services available, Hilly regions in Mizoram Arunachal and Sikkim had the highest availability of physical healthcare services while the lowest was found in Manipur valley region. Among the district, Serchhip of Mizoram had the highest availability of physical healthcare services and Chandel district of Manipur had the lowest. The level of regional inequality was found to be in medium range which was the case in district level too.
- In terms of total human resources available, Hilly region in Sikkim had the highest human resources while Hilly region in Tripura had the lowest human resources. At district level, Aizawl had the highest available human resources and Dibang valley had the lowest availability of human resources. The level of inequality was very high amongst the regions as well as the districts.
- Total healthcare facilities were found to be the highest in Hilly region in Mizoram and lowest in Hilly region Tripura with low level of inequality in availability of healthcare facilities in the region. At district level, Aizawl had the highest healthcare services while Chandel had the lowest with medium level of inequality in the districts.
- Accessibility of healthcare facilities is very important for ensuring the utilization of health facilities. In terms of villages with SC within 3 kms, Manipur valley had the highest accessibility at sub-centre level. While, Arunachal Pradesh hill had the lowest accessibility which shows that topography influences the accessibility in a region. The level of inequality was found to be high in the regions of Northeast India. At district level, Bishnupur district which is a part of the valley region of Manipur had the highest accessibility. This might be due to plain topography and availability of transportation facilities. Other districts like Dibang Valley, Peren and West Tripura had zero per cent accessibility. As such there exists high inequality with regard to accessibility amongst the districts of the region.
- In terms of villages with PHC within 10 kms, Valley regions in Tripura had the highest accessibility while Hilly region in Mizoram had the lowest accessibility. Among the districts, Imphal West registered the highest accessibility which apart

from being a plain area also happened to be a part of capital city of Manipur. The least accessibility was found in Zunheboto which is a part of hilly region of Nagaland. This shows that topography to some extent determines the accessibility of healthcare facilities across regions and districts. The level of inequality was found to be medium range in the regions while it was high amongst the districts. At state level too, the inequality was found to be high.

- In terms of villages with CHC within 20 Kms, the valley regions had better accessibility with 81.39 per cent of village lying within 20kms from CHC than the hilly region which had just 44.22 per cent villages within 20 Kms from CHC. But the norm for distance should be lesser for hilly regions than the Valley regions as rough topography means travel time will be more in hilly regions than the Valley regions. Manipur valley had the best accessibility and Mizoram hills had the least accessibility. This shows the influence of topography in accessing healthcare facilities. At district level, Imphal West had the best accessibility and Dhalai of Tripura which happened to be a hilly region with least accessibility. This apart from the role of topography can also be due to the fact that Imphal west happened to be a part of the capital city of Manipur. The level of inequality in accessibility was low at regional level but high at district level.
- In terms of accessibility of human resources, Sikkim hilly region had the highest accessibility of human resources and Tripura hills the least with medium range of inequality in accessibility with a CV of 31.14. At district level, West Kameng had the highest accessibility and West Garo Hills, Lunglei, Lunglei, Mon and Zunheboto had the least accessibility (zero per cent). The level of inequality was also very high across the districts.
- Affordability of healthcare facilities has been studied by taking out of pocket expenditure as dummy variable. Affordability of healthcare revealed those regions and districts with high availability of healthcare had low OOP expenditure. Regions with low healthcare facilities had low affordability. Amongst the regions, Valley regions in Manipur had the lowest affordability and highest out of pocket (OOP) expenditure. Meghalaya hilly region had the highest affordability with least OOP expenditure. The level of inequality was found to be high among the regions. At

district level, Kurung Kumey had the least affordability with low availability of healthcare facilities while the highest affordability was found in East Garo Hills of Meghalaya. The level of inequality was very high when districts are considered as units of analysis.

- The outcome of healthcare services had been analyzed using morbidity and proportion of death rate. Acute diseases are the most prevalent in Northeast which might be due to the sub-tropical evergreen climatic conditions of the region which is conducive for illness like fever, diarrhoea, dysentery. Among the various types of illness, ‘Other – fever’ had the highest prevalence in the Northeastern region followed by ART infection. Diseases of the digestive system were found to be the most prevalent among the chronic diseases.
- Among the region, Hilly region of Manipur had the highest prevalence of acute diseases while Hilly region Meghalaya had the lowest prevalence of acute diseases. Hilly region of Manipur had low availability of healthcare services. At district level, Lohit and Tirap had the highest prevalence of acute diseases with ‘other fever’ and short duration fever with rashes being the most prevalent diseases. These districts have low availability of healthcare services. The East Garo Hills districts had the lowest prevalence of acute diseases.
- Prevalence of diseases across the socio-economic stratum revealed that the ‘Other’ category of social groups had the highest prevalence of acute diseases followed by OBC and SC groups. Across the occupational category, people engaged in primary occupational had the highest prevalence of acute diseases. Across the educational category, population who are graduates recorded the highest prevalence of both acute and chronic diseases which showed that the level of education attained does not determine the diseases one gets affected with. But, it can also be a reason that with education, reporting of illness improves while with lower level of education, there might be cases of under reporting.
- Prevalence of acute diseases had been found to be linked with availability of healthcare facilities in both the regional and district level. At regional level, Hills and Valley regions in Manipur had the highest prevalence of acute diseases which might be due to the low availability of health facilities in the regions. Valley regions in

Manipur had prevalence of acute diseases of 217 per 1000 population with low availability of healthcare facilities with a CI of 22.33. Hill regions in Manipur had prevalence of 190 per 1000 population with a CI of 20.45. While the neighboring state of Nagaland reported low prevalence of acute disease in the hill region with a prevalence of 71 cases of acute diseases per 1000 population which had better healthcare facilities with a CI of 26.35.

- At district level acute disease was more prevalent in Lohit (280 per 1000 populations) and Tirap (277 per 1000 populations) district of Arunachal Pradesh. These districts had low availability of healthcare facilities with a CI of 26.57 and 16.26 respectively.
- In terms of chronic disease too, Valley regions in Manipur had the highest prevalence of chronic diseases with infectious and parasitic diseases and diseases of endocrine, nutritional and metabolic disorder being the most prevalent diseases. This may have been due to low availability of healthcare services. While chronic diseases were found to be very low in Nagaland hilly region which had better availability of healthcare services than the valley regions of Manipur. At district level, Thoubal district had the highest prevalence of chronic diseases (144 per 1000 population) which may be attributed to the low availability of healthcare facilities along with other local factors. Aizawl had low prevalence of chronic diseases (37 per 1000 population) with had high availability of healthcare services with composite index of 60.84.
- In terms of proportion of death, Hilly region in Mizoram had the highest proportion of death (30 per 1000 populations) and hilly region in Meghalaya (8 per 1000 population) had the lowest. At district level, North district had the highest proportion of 36 deaths per 1000 populations and West Garo Hills lowest in Northeast India.
- Amongst social groups, SC and ST groups had the highest percentage despite the 'Other' category reporting more diseases. This clearly suggests that both these groups have lesser access to healthcare and hence more cases of mortality. In the occupational category, primary occupational group had the highest proportion of deaths while level of education one attained had no effect upon proportion of death.

Availability of healthcare facilities had negative relation with prevalence of acute and chronic diseases. This underscores the need to increase the healthcare facilities available at regional and district level so as to provide services at optimum level. Focus should be on increasing the healthcare facilities in regions and districts which need them. At the same time, the essential facilities required for proper functioning of healthcare facilities like regular electricity, water supply, residential quarters, OT facilities at CHC, specialists at CHC, ANM, and MHW etc. should be provided. It has been found from the study that there exists huge shortage of human resources in regions like the hilly region of Arunachal Pradesh and Tripura. Mere providence of healthcare services is not adequate, proper road facilities needs to be in place to ensure accessibility to healthcare services. The minimum distance norm for location of healthcare facilities should be followed.

It is a well known fact that hilly regions of Northeast are not densely populated; just looking at only the population- provider ratio is not enough to ensure access. Distance norm hence become important here in Northeast. Efforts should be made to provide healthcare centres like CHC in hilly areas which are less accessible even if even separate population norm has to be evolved for such low density region. Affordability of healthcare services has been found to be very low in regions or district with low availability of healthcare services. This clearly shows that availability, accessibility and affordability are related with each other and low performance in one of them may affect the healthcare outcomes of that particular region. The study also finds that social status and caste scheduled tribe population has clear relation with prevalence of acute and chronic diseases. Those at lower strata suffer more than those at higher social strata.

Availability of healthcare facilities cannot be the only factor for good outcome of health as it has been established. Further research is needed to arrive at a particular equation for good health. Other factors like those of people engaged in primary occupation have more chances of acquiring both acute and chronic illness which is quite logical owing to the arduous nature of their work in harsh topography and poor healthcare facilities. The recommendation of Bhore committee (1946) for giving six medical officers to primary unit, that of Mudaliar Committee (1962) to keep 10 beds in a primary unit etc have remained unfulfilled. The goal of accessible, affordable healthcare as stated in the seventh five year plan is still a dream.

There is still lack of healthcare facilities and shortages of health workers in Northeast India which points out to the lack of political will on part of government to execute the recommendations so as to ensure a more accessible and more affordable healthcare services. As the saying goes, health is wealth, healthy population means lesser burden of disease which will ensure increase in productivity and increase in health and wealth of the population.

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Annexure Table No. 1 Co-efficient of Variation of facilities available at SC, PHC and CHC.

	Co-efficient of Variation of facilities available at SC, PHC and CHC.								
State/district	CV Average person covered person per SC	CV Average person covered person per PHC	CV Average person covered person per CHC	CV Other healthcare facilities available at Sub-centre	CV Other healthcare facilities available at Primary Health Centre	CV Total Physical Healthcare Facilities Available	CV Human resources available at SC	CV Human resources available at PHC	CV Total Healthcare Facilities Available
Arunachal Pradesh	76.94	48.67	52.47	40.69	57.08	32.60	35.38	87.13	55.34
Manipur	36.77	34.41	57.41	48.16	38.57	27.05	34.06	20.08	25.02
Meghalaya	23.38	18.18	12.83	34.92	16.98	29.61	68.92	7.37	22.35
Mizoram	98.26	40.77	43.90	72.51	44.02	32.19	9.39	8.94	54.61
Nagaland	70.57	85.34	95.36	22.51	17.36	35.44	41.09	51.17	30.20
Sikkim	28.52	40.48	0.00	6.04	5.66	19.69	8.86	16.69	28.55
Tripura	16.45	23.32	28.35	36.43	9.16	32.39	12.50	20.85	61.82
Assam	20.05	42.16	33.42	27.83	16.30	14.44	13.72	33.67	24.64
District level	59.71	73	78.59	44.18	37.61	37.09	31.50	49.05	35.12
Regional level (Hill and Valley regions)	49	61	68	45.10	33.7	37.75	25.37	31.68	24.63
	16.45	48.67	33.42						



Annexure Table No. 2 Co-efficient of Variation of accessibility of SC, PHC and CHC.

State/district	CV of Percentages of villages with accessibility to Sub-centre within 3kms	CV of Percentages of villages with accessibility to Primary Health Centre within 10 kms	CV of Percentages of villages with accessibility to Community Health Centre within 20kms	CV of Percentages of villages with accessibility of human resources	CV of Affordability Of Healthcare services
Arunachal Pradesh	64.71	41.46	26.82	71	39.18
Manipur	62.05	42.06	43.70	41.67	29.15
Meghalaya	13.40	41.75	48.25	84.02	54.92
Mizoram	59.27	31.01	30.85	80.07	30.96
Nagaland	49.59	49.25	47.48	62.59	94.32
Sikkim	14	23.75	42.66	97.98	19.68
Tripura	94.76	12.71	46.29	56.47	25
Assam	N.A.	N.A.	N.A.	N.A.	N.A.
District level	59.04	48.11	47.03	64.86	59.55
Regional level	37.70	35.63	24.66	31.14	54.66

AnnexureTable No. 3 Accessibility to SC, PHC and CHC from the villages.

District	Categories of districts with accessibility to Sub-centre			Categories of districts with accessibility to Primary Health Centre within 10 kms			Categories of districts with accessibility to Community Health Centre		
	1(within 3kms from villages)	2(between 4to 10kms from villages)	3 (10kms and above from the villages)	1(within 10 kms from villages)	2 (between 11 to 20kms from villages)	3 (20 kms and above from villages)	1(within 20 kms from villages)	2(between 21 to 40kms from villages)	3(40 kms and above from villages)
Tawang	26.32	36.84	36.84	33.33	23.33	43.33	42.86	35.71	21.43
West Kameng	10.00	50.00	40.00	47.06	41.18	11.76	62.50	8.33	29.17
East Kameng	28.57	28.57	42.86	44.44	33.33	22.22	47.37	15.79	36.84
Papum Pare	63.64	27.27	9.09	80.00	0.00	20.00	50.00	33.33	16.67
Lower Subansiri	27.78	38.89	33.33	64.29	17.86	17.86	65.52	6.90	27.59
Upper Subansiri	38.89	22.22	38.89	41.67	20.83	37.50	46.15	15.38	38.46
West Siang	41.18	23.53	35.29	60.87	34.78	4.35	50.00	30.77	19.23
East Siang	18.18	36.36	45.45	73.68	5.26	21.05	72.73	27.27	0.00
Upper Siang	20.00	20.00	60.00	10.00	10.00	80.00	55.56	33.33	11.11
Dibang valley	0.00	33.33	66.67	33.33	16.67	50.00	66.67	33.33	0.00

Lohit	28.57	52.38	19.05	57.14	42.86	0.00	81.48	11.11	7.41
Changlang	41.67	50.00	8.33	52.00	28.00	20.00	56.67	40.00	3.33
Tirap	14.29	38.10	47.62	36.36	9.09	54.55	21.43	53.57	25.00
Kurung Kumey	7.69	46.15	46.15	22.22	44.44	33.33	31.82	22.73	45.45
Lower Dibang Valley	20.00	65.00	15.00	45.45	22.73	31.82	65.00	15.00	20.00
Anjaw	5.00	45.00	50.00	20.00	8.57	71.43	61.11	22.22	16.67
Senapati	46.43	46.43	7.14	75.76	12.12	12.12	64.52	25.81	9.68
Tamenglong	11.11	11.11	77.78	40.00	26.67	33.33	46.67	13.33	40.00
Churachandpur	60.00	25.00	15.00	62.50	20.83	16.67	33.33	25.00	41.67
Bishnupur	83.33	0.00	16.67	88.24	11.76	0.00	95.45	4.55	0.00
Thoubal	81.82	9.09	9.09	87.50	12.50	0.00	90.91	9.09	0.00
Imphal West	66.67	33.33	0.00	100.00	0.00	0.00	100.00	0.00	0.00
Imphal East	73.33	26.67	0.00	88.89	11.11	0.00	100.00	0.00	0.00
Ukhrul	7.69	69.23	23.08	35.00	20.00	45.00	33.33	33.33	33.33
Chandel	15.38	38.46	46.15	22.22	33.33	44.44	41.18	29.41	29.41
West Garo Hills	51.61	45.16	3.23	33.33	60.61	6.06	53.13	25.00	21.88
East Garo Hills	69.23	23.08	7.69	58.62	24.14	17.24	29.63	44.44	25.93

South Garo Hills	53.85	46.15	0.00	38.46	34.62	26.92	21.74	17.39	60.87
West Khasi Hills	54.55	22.73	22.73	14.29	50.00	35.71	10.71	42.86	46.43
Ri Bhoi	63.33	30.00	6.67	42.42	36.36	21.21	53.13	21.88	25.00
East Khasi Hills	72.73	27.27	0.00	71.43	28.57	0.00	62.50	18.75	18.75
Jaintia Hills	65.22	26.09	8.70	50.00	26.47	23.53	45.71	22.86	31.43
Mamit	18.18	54.55	27.27	29.17	33.33	37.50	31.82	27.27	40.91
Kolasib	73.33	6.67	20.00	26.67	33.33	40.00	9.09	63.64	27.27
Aizawl	83.33	16.67	0.00	25.00	50.00	25.00	28.57	14.29	57.14
Champhai	33.33	33.33	33.33	15.79	36.84	47.37	26.67	33.33	40.00
Serchhip	57.14	28.57	14.29	25.00	37.50	37.50	25.00	25.00	50.00
Lunglei	8.33	41.67	50.00	9.52	38.10	52.38	20.00	26.67	53.33
Lawngtlai	36.36	22.73	40.91	24.00	8.00	68.00	20.00	20.00	60.00
Saiha	40.00	20.00	40.00	31.58	36.84	31.58	30.00	10.00	60.00
Mon	33.33	33.33	33.33	75.00	12.50	12.50	42.86	28.57	28.57
Tuensang	42.86	21.43	35.71	43.75	25.00	31.25	58.33	33.33	8.33
Mokokchung	23.08	15.38	61.54	43.75	37.50	18.75	42.86	38.10	19.05
Zunheboto	66.67	0.00	33.33	0.00	50.00	50.00	40.00	40.00	20.00

Wokha	25.00	25.00	50.00	46.67	13.33	40.00	55.56	11.11	33.33
Dimapur	42.86	28.57	28.57	61.54	23.08	15.38	50.00	33.33	16.67
Kohima	50.00	0.00	50.00	75.00	25.00	0.00	88.89	11.11	0.00
Phek	41.18	29.41	29.41	62.50	18.75	18.75	64.71	5.88	29.41
Kiphire	23.08	7.69	69.23	16.67	16.67	66.67	15.79	5.26	78.95
Longleng	36.36	18.18	45.45	58.82	23.53	17.65	75.00	25.00	0.00
Peren	0.00	33.33	66.67	36.36	36.36	27.27	9.09	9.09	63.64
North	61.11	38.89	0.00	60.71	17.86	21.43	50.00	50.00	0.00
West	46.67	46.67	6.67	76.67	10.00	13.33	66.67	16.67	16.67
South	53.85	46.15	0.00	58.62	31.03	10.34	44.44	27.78	27.78
East	45.45	45.45	9.09	42.11	47.37	10.53	20.00	20.00	60.00
West Tripura	0.00	100.00	0.00	64.71	23.53	3.09	76.19	14.29	9.52
South Tripura	75.00	25.00	0.00	69.57	26.09	1.44	57.14	28.57	14.29
Dhalai	20.00	80.00	0.00	85.19	14.81	0.00	25.71	34.29	40.00

Annexure Table No. 4 Affordability of Healthcare services and sources of Out of Pocket Expenditure.

District	Expenditure on institutional delivery (INR)	Financial assistance received from JSY/Other	Total OOP EXP	Percentage s borrowed	Percentage s selling property & jewellery	Percentage s insurance coverage	Percentage s Don't Know	Percentage s Other
Tawang	16240	1247	14994	7.17	0.00	1.59	56.97	34.26
West Kameng	15478	1083	14395	2.64	0.00	0.99	59.08	37.29
East Kameng	15071	1582	13488	6.82	0.38	1.14	56.06	35.61
Papum Pare	14691	1127	13564	6.21	0.98	3.27	67.97	21.57
Lower Subansiri	14649	1165	13485	10.09	0.00	11.99	52.68	25.24
Upper Subansiri	15226	1241	13985	0.58	0.00	0.58	76.09	22.74
West Siang	14198	1277	12921	4.13	0.46	10.55	69.27	15.60
East Siang	14143	1261	12882	4.57	0.00	0.46	69.41	25.57
Upper Siang	13738	1266	12472	2.55	0.00	0.51	88.78	8.16
Dibang valley	13076	1495	11581	5.23	1.16	1.16	59.30	33.14
Lohit	12284	2232	10052	12.39	1.97	0.28	67.61	17.75
Changlang	11270	1941	9329	10.82	3.36	1.87	70.52	13.43

Tirap	11240	1450	9790	5.26	0.28	2.49	70.64	21.33
Kurung Kumey	10717	2544	8173	7.30	3.00	0.86	69.53	19.31
Lower Dibang	10693	1595	9099	7.65	5.10	16.84	52.55	17.86
Anjaw	10642	1836	8805	4.96	0.00	0.00	68.70	26.34
Senapati	10547	1693	8854	6.92	0.00	0.00	32.87	60.21
Tamenglong	10323	2321	8002	15.50	0.00	3.50	41.00	40.00
Churachandpur	10193	2328	7865	17.31	4.33	0.48	38.46	39.42
Bishnupur	8684	2358	6326	21.24	1.54	1.16	27.41	48.65
Thoubal	8582	2075	6506	23.36	9.03	1.87	21.18	44.55
Imphal West	8539	1551	6988	15.22	7.25	1.09	21.74	54.71
Imphal east	8285	1944	6340	21.26	4.65	0.66	22.59	50.83
Ukhrul	8229	7331	898	14.74	2.11	0.70	43.86	38.60
Chandel	8134	1473	6661	14.53	1.74	1.16	31.40	51.16
West Garo Hills	8124	1190	6934	7.19	9.15	0.00	82.35	1.31
East Garo Hills	7694	2263	5432	6.23	1.48	0.30	91.10	0.89

South Garo Hills	7549	1519	6030	0.00	0.00	0.00	95.65	4.35
West Khasi Hills	7536	1646	5890	0.56	0.56	0.00	78.53	20.34
Ri Bhoi	7411	4776	2635	1.52	0.30	0.00	68.79	29.39
East Khasi Hills	7360	1778	5582	1.87	0.00	0.47	56.54	41.12
Jaintia Hills	6926	1437	5489	4.35	0.00	0.27	56.25	39.13
Mamit	6698	1435	5263	12.93	7.57	0.00	39.43	40.06
Kolasib	6695	1644	5051	5.21	0.55	1.37	6.58	86.30
Aizawl	6672	1942	4730	7.74	3.10	1.55	13.31	74.30
Champhai	6440	1355	5085	10.33	0.30	0.61	32.22	56.53
Serchhip	6370	1688	4682	4.73	0.00	0.00	5.99	89.27
Lunglei	6029	1429	4600	13.10	8.63	0.32	40.58	37.38
Lawngtlai	6018	1316	4702	5.68	0.74	0.00	25.19	68.40
Saiha	6000	1325	4675	20.05	8.40	0.54	19.51	51.49
Mon	5792	1212	4580	5.79	0.00	7.44	42.15	44.63
Tuensang	5775	1585	4190	42.12	1.10	5.13	21.61	30.04



Mokokchung	4958	1861	3097	10.81	0.00	27.03	28.83	33.33
Zunheboto	4935	1538	3397	20.93	0.00	30.23	44.19	4.65
Wokha	4834	1651	3183	11.85	0.00	28.89	53.33	5.93
Dimapur	4686	1022	3665	14.71	0.00	11.76	37.75	35.78
Kohima	4423	691	3732	11.65	0.97	5.83	30.10	51.46
Phek	4339	688	3651	0.00	0.00	59.26	33.33	7.41
Kiphire	4163	1468	2695	10.34	0.00	10.34	55.17	24.14
Longleng	4039	2069	1970	11.59	0.00	43.48	36.23	8.70
Peren	3935	5980	-2045	4.12	0.00	8.25	27.84	59.79
North	3788	1218	2570	7.35	0.98	0.00	78.92	12.75
West	3750	1555	2195	3.94	0.00	0.00	89.66	6.40
South	3098	684	2413	5.52	0.00	0.00	90.34	4.14
East	2718	692	2026	8.60	6.45	19.35	38.71	26.88
North	2000	0	0	7.35	0.98	0.00	78.92	12.75
West	1917	1200	717	3.94	0.00	0.00	89.66	6.40
South	1870	1543	327	5.52	0.00	0.00	90.34	4.14
East	1000	1131	-131	8.60	6.45	19.35	38.71	26.88

West Tripura	6698	1435	5263	34.07	2.75	2.75	18.68	16.48
South Tripura	6029	1429	4600	51.72	0.69	0.69	18.62	6.55
Dhalai	4958	1861	3097	57.44	1.79	1.79	16.96	4.17
North Tripura	4935	1538	3397	62.92	4.21	4.21	17.98	4.78

Annexure Table No. 5 Acute diseases and availability of healthcare facilities across regions.

A C U T E D I S E A S E S A C R O S S D I S T R I C T S	Availability of healthcare facilities across regions				
	Acute prevalence of morbidity categories per 1000 population	Very low (13.19 to 19.6)	Low (19.6 to 26.01)	Medium (26.01 to 32.42)	High (32.42 to 38.83)
	High (177 and above)	N.A.	Manipur valley, Manipur hills	N.A.	N.A.
	Medium	Tripura hills	A P Hills	N.A.	N.A.
	Low	N.A.	Tripura valley, Nagaland hills, Nagaland valley		Mizoram hills, Sikkim hills,
	very low	N.A.	N.A.	Meghalaya hills	N.A.

Annexure Table No. 6 Chronic diseases and availability of healthcare facilities across regions.

C H R O N I C D I S E A S E S A C C R O S S D I S T R I C T S		Availability of healthcare facilities across regions			
	Prevalence of Chronic diseases per 1000 population	Very low (13.19 to 19.6)	Low (19.6 to 26.01)	Medium (26.01 to 32.42)	High (32.42 to 38.83)
	Very High (122 and above)	N.A.	Manipur valley	N.A.	N.A.
	High (88 to 122)	N.A.	Manipur hills	Arunachal Pradesh Hills	Sikkim hills
	Medium (53 to 88)	Tripura hills	Tripura valley, Nagaland valley	Meghalaya hills	Mizoram hills
	Low (18 to 53)	N.A.	N.A.	Nagaland hills	N.A.
	Very Low (18 and below)	N.A.	N.A.	N.A.	N.A.

Annexure Table No. 7 Proportion of deaths and availability of healthcare facilities across regions.

D E A T H S A C R O S S D I S T R I C T S\		Availability of healthcare facilities across regions			
	Proportion of death per 1000 population category	Very low (13.19 to 19.6)	Low (19.6 to 26.01)	Medium (26.01 to 32.42)	High(32.42 to 38.83)
	Very High (28 to 35)	N.A.	N.A.	N.A.	Mizoram hills
	High (13 to 28)	Tripura hills	Manipur valley, Tripura valley	Arunachal Pradesh Hills	Sikkim hills
	Medium (13 to 21)	N.A.	Manipur hills, Nagaland valley	Nagaland hills	N.A.
	Low (6 to 13)	N.A.	N.A.	Meghalaya hills	N.A.

Annexure Table No. 8 Sample sizes for acute diseases across districts.

Districts	Acute diseases Sample size	Districts	Acute diseases Sample size
Tawang	648	East Khasi Hills	189
West Kameng	862	Jaintia Hills	474
East Kameng	698	Mamit	369
Papum Pare	784	Kolasib	535
Lower Subansiri	975	Aizawl	343
Upper Subansiri	942	Champhai	353
West Siang	901	Serchhip	610
East Siang	824	Lunglei	399
Upper Siang	436	Lawngtlai	792
Dibang Valley	440	Saiha	675
Lohit	1,464	Mon	195
Changlang	991	Tuensang	235
Tirap	1,620	Mokokchung	261
Kurung Kumey	573	Zunheboto	221
Lower Dibang Valley	527	Wokha	348
Anjaw	644	Dimapur	379
Senapati	1,164	Kohima	328
Tamenglong	578	Phek	198
Churachandpur	1,146	Kiphire	143
Bishnupur	1,133	Longleng	320
Thoubal	1,107	Peren	170
Imphal west	1,107	North	427
Imphal East	908	West	599
Ukhrul	566	South	461
Chandel	616	East	302
West Garo Hills	193	West Tripura	325
East Garo Hills	275	South Tripura	395
South Garo Hills	16	Dhalai	715
West Khasi Hills	203	North Tripura	709
Ri Bhoi	270		

Annexure Table No. 9 Sample sizes for chronic diseases across districts.

Districts	Chronic diseases sample size	Districts	Chronic diseases sample size
Tawang	370	East Khasi Hills	153
West Kameng	360	Jaintia Hills	349
East Kameng	308	Mamit	99
Papum Pare	444	Kolasib	203
Lower Subansiri	562	Aizawl	184
Upper Subansiri	363	Champhai	161
West Siang	601	Serchhip	178
East Siang	349	Lunglai	113
Upper Siang	98	Lawngtlai	160
Dibang Valley	222	Saiha	142
Lohit	387	Mon	195
Changlang	173	Tuensang	235
Tirap	562	Mokokchung	261
Kurung Kumey	228	Zunheboto	221
Lower Dibang Valley	148	Wokha	348
Anjaw	261	Dimapur	379
Senapati	549	Kohima	328
Tamenglong	172	Phek	198
Churachandpur	354	Kiphire	143
Bishnupur	604	Longleng	320
Thoubal	697	Peren	170
Imphal west	466	North	319
Imphal East	648	West	399
Ukhrul	370	South	273
Chandel	327	East	330
West Garo Hills	48	West Tripura	130
East Garo Hills	174	South Tripura	196
South Garo Hills	15	Dhalai	211
West Khasi Hills	68	North Tripura	198
Ri Bhoi	164		

Annexure Table No 10. List of Chronic Diseases Reported under chronic category of diseases by DLHS-4

Different Types Of Chronic Diseases		
Chronic Renal Diseases	Asthma/ Chronic respiratory Failure	Tumor (any type)
Hypertension	Glaucoma	Cancer- Genitourinary System
Gall Stone/ Cholecystitis	Goitre / Thyroid disorder	Blood cancer/ Leukemia
Chronic Heart Disease	Sinusitis, Tonsillitis	Cancer –Breast
Chronic Liver Diseases	Tuberculosis	Skin cancer
Myocardial infection/ heart attack	Flourosis	Renal Stone
Rheumatoid Arthritis	Leprosy	Piles,anal fisure,anal fistula
Stroke cerebro vascular accident	Pyorrhoea	Others (hernia, Hydrocele, peptic ulcer, etc)
Chronic skin Disease/ Psoriasis	Cancer – Respiratory System	Anaemia
Epilepsy	Rheumatic fever/heart diseses	Not Diagnosed
Cataract	Cancer- Gastrointestinal system	Diabetes



Annexure Table No.11 Composite Index value of Healthcare facilities and services available at District Hospital.

Category with CI range	Hill and Valley Regions	CI Healthcare facilities and services available at District Hospital
High (0.97 and above)	Sikkim hills	1.13
	Tripura valley	1.01
Medium (0.64 to 0.97)	Mizoram hills	0.94
	Assam valley	0.89
	Nagaland hills	0.64
	Nagaland valley	0.63
Low (0.31 to 0.64)	Assam hills	0.63
	Meghalaya hills	0.50
	Arunachal Pradesh Hills	0.46
	Manipur hills	0.40
	Manipur valley	0.31
Very Low (0.31 and below)	Tripura hills	0.00

Annexure Map 1 Hill and Valley Districts map of Northeastern Region of India

