ECONOMIC ANALYSIS OF PUBLIC HEALTHCARE SYSTEM IN MIZORAM

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ECONOMIC ANALYSIS OF PUBLIC HEALTHCARE SYSTEM IN MIZORAM

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CERTIFICATE

This is to certify that the thesis entitled **"Economic Analysis of Public Healthcare System in Mizoram"** by Shri. Lalrinkima has been written under my guidance. This thesis is the result of his investigation into the subject and was never submitted to any other University for any research degree.

(PROF. LALHRIATPUII)

DECLARATION

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May 2023

I, Lalrinkima, hereby declare that the subject matter of this thesis is the record of work done by me, that the contents of this thesis did not form basis of the award of any previous degree to me or to do the best of my knowledge to anybody else, and that this thesis has not been submitted by me for any research degree in any other University/Institute.

This is being submitted to the Mizoram University for the degree of Doctor of Philosophy in Economics.

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(LALRINKIMA)

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LIST OF ABBREVIATIONS

AAY	Antyodaya Anna Yojana
ALS	Average Length of Stay
APL	Above Poverty Line
ART	Antiretroviral Therapy
BPL	Below Poverty Line
CPI	Consumer Price Index
CRS	Constant Returns to Scale
CSSD	Central Sterile Service Department
DEA	Data Envelopment Analysis
DMU	Decision Making Units
ECG	Electrocardiogram
EEG	Electroencephalogram
effch	Efficiency Change
ENT	Ears, Nose and Throat
FMW	Female Medical Ward
FY	Financial Year
GDP	Gross Domestic Product
GO	Generator Operator
GSDP	Gross State Domestic Product
GW	General Ward
ICU	Intensive Care Unit
IMR	Infant Mortality Rate
INR	Indian Rupee
KMO	Kaiser-Meyer-Olkin
MPI	Malmquist Productivity Index
MPW	Maternal and Pregnancy Ward
MR	Medical Reimbursement
MRA	Multipurpose Rehabilitation Assistant
MRT	Medical Record Technician
MS	Monetary Savings
MSHC	Mizoram State Healthcare Scheme
NCD	Non-Communicable Disease
NH	National Highway
NICU	Newborn Intensive Care Unit
OA	Office Assistant

OC	Opportunity Cost
OPD	Out Patient Department
OST	Opiod Substitution Therapy
PC	Private Cost
pech	Pure Efficiency Change
PFT	Pulmonary Function Test
PMR	Physical Medicine and Rehabilitation
PMW	Permanent Workers
PPP	Purchasing Power Parity
RSBY	Rashtriya Swasthya Bima Yojana
SAARC	South Asian Association for Regional Cooperation
sech	Scale Efficiency Change
SERVQUAL	Service Quality
SSR	Staff Sick Room
te	Technical Efficiency
techch	Technical Efficiency Change
TFP	Total Factor Productivity
tfpch	Total Factor Productivity Change
TIP	Total In-patient
TOR	Turn Over Rate
USD	United States Dollar
VRS	Variable Returns to Scale
WHO	World Health Organization
WOM	Word-of-Mouth

CHAPTER I

INTRODUCTION

1.1: INTRODUCTION

There is a worldwide consensus that health is one of the most important factors for social welfare, economic growth and development and progress at large. A healthy population leads to a vibrant and strong economy by increasing the productivity as well as the working capacity of the labour force. Hence, a healthy population or workforce is necessary for human resource development which will ultimately lead to the desired outcome of any economic policy—sustained long-run growth and development. As such, the importance of health cannot be neglected in the field of economic study and research. At the same time, an unhealthy population riddled with chronic disease, epidemic and many other maladies is a burden for all policy makers and Governments across the world at large. So, a sound economic progress is liked with health and the provision of healthcare facilities to its population.

The word health is an important factor today in everybody life because if we are physically and mentally healthy then we can definitely enjoy a healthy life too. A good and a strong health is not something that is sold at a store but it is something that we have to create and also maintain at the same time. Good health is very important because a person of good health can put through a large amount of work in a short time. A person of perfect health does not shirk his duties. He can work properly and leaves nothing undone. As a student, he shines in his examinations. As a public worker, he renders valuable service and is duly rewarded. One can start with following the pattern of eating the right things at the right time and also exercising too. These healthy patterns will help to lead to reduced illness which in turn will also help save a lot of money that we turn up spending for recovering from various illnesses.

Better health is central to human happiness and well-being. It also makes an important contribution to economic progress, as healthy population lives longer, is more productive, and saves more. A good health is achieved by following a few collective patterns which are health related. If we follow this logic, we will also realize the importance of having healthy lifestyles which will add to the benefits of having a healthy life. Achieving and maintaining

health is an ongoing process, shaped by both the evolution of health care knowledge and practices as well as personal strategies and organized interventions for staying healthy. Therefore, good health is a priceless blessing in life. The famous saying ‘Health is Wealth’ highlights the importance of good health in our life.

1.2: AREA OF THE STUDY

Mizoram is one of the states of Northeast India, with Aizawl as its capital city. The name is derived from Mi (people), Zo (lofty place, such as a hill) and Ram (land), and thus Mizoram implies *"Land of the hill people"*. Like several other northeastern states of India, Mizoram was previously part of Assam until 1972, when it was carved out as a Union Territory. It became the 23rd state of India, a step above Union Territory, on 20 February 1987.

Mizoram's population was 1,091,014, according to a 2011 census. It is the 2nd least populous state in the country. Mizoram covers an area of approximately 21,087 square kilometers. About 91% of the state is forested. About 95% of current Mizoram population is of diverse tribal origins who settled in the state, mostly from southeast Asia, over waves of migration starting about 16th century but mainly in 18th century. This is the highest concentration of tribal people among all states of India, and they are currently protected under Indian constitution as a Scheduled Tribe. The tribes converted from Animist religions to Christianity over the first half of 20th century. Mizoram is one of three states of India with a Christian majority (87%). Its people belong to various denominations, mostly Presbyterian in its North and Baptists in South.

Mizoram is a highly literate agrarian economy, but suffers from slash-and-burn jhum or shifting cultivation, and poor crop yields. In recent years, the jhum farming practices are steadily being replaced with a significant horticulture and bamboo products industry. Mizoram economy continue to record an impressive growth with the total Gross State Domestic Product (GSDP) of the State at current prices estimated at Rs. 22240.57crore in 2018-19 as against Rs. 19328.64 crore in 2017-18, thereby registering an increase of 13.04 percent. Moreover, the economy is expected to growth continuously at double digit rate. It is

projected to growth during the current fiscal year (advance estimate) at 12.25 percent. The state has about 871 kilometers of national highways, with NH-54 and NH-150 connecting it to Assam and Manipur respectively. It is also a growing transit point for trade with Myanmar and Bangladesh.

Mizoram is a land of rolling hills, valleys, rivers and lakes. As many as 21 major hill ranges or peaks of different heights run through the length and breadth of the state, with plains scattered here and there. The average height of the hills to the west of the state are about 1,000 meters (3,300 ft). These gradually rise up to 1,300 meters (4,300 ft) to the east. Some areas, however, have higher ranges which go up to a height of over 2,000 meters (6,600 ft). Phawngpui Tlang also known as the Blue Mountain, situated in the south-eastern part of the state, is the highest peak in Mizoram at 2,210 meters (7,250 ft). About 76% of the state is covered by forests, 8% is fallows land, 3% is barren and considered uncultivable area, while cultivable and sown area constitutes the rest. As per state of forest report 2015 states with maximum forest cover as percentage of their own geographical area. Mizoram being the highest 88.93% Forest.

Mizoram terrain is, according to Geological Survey of India, an immature topography, and the physiographic expression consists of several, almost North-South longitudinal valleys containing series of small and flat hummocks, mostly anticlinal, parallel to sub-parallel hill ranges and narrow adjoining synclinal valleys with series of topographic highs. The general geology of western Mizoram consists of repetitive succession of Neogene sedimentary rocks of Surma Group and Tipam Formation viz. sandstone, siltstone, mudstone and rare pockets of shell limestone. The eastern part is Barail Group. Mizoram, lies in seismic zone V, according to the India Meteorological Department; as with other northeastern states of India, this means the state has the highest risk of earthquakes relative to other parts of India.

The biggest river in Mizoram is Chhimtuipui, also known as Kaladan, Kolodyne or Chimtuipui. It originates in Chin state in Burma and passes through Saiha and Lawngtlai districts in the southern tip of Mizoram, goes back to Burma's Rakhine state. Although many more rivers and streams drain the hill ranges, the most important and useful rivers are the

Tlawng, Tut, Tuirial and Tuivawl which flow through the northern territory and eventually join the Barak River in Cachar District. The rivers have a gentle drainage gradient particularly in the south.

1.3: PUBLIC HEALTHCARE IN MIZORAM

Healthcare covers a broad spectrum of personal health services ranging from health education and information through prevention of disease, early diagnosis, treatment and rehabilitation. The term health services imply organisation, delivery, staffing, regulatory and quality control (Thangdailova, 2003). Equitable distribution of healthcare facilities matters a lot for serving the needy population and it is first of all, critical to understand the context of time and space. It is important to examine the healthcare history of the area of study to be able to understand how far progress have been made, what things to be expected and what should be the future vision as well. Mizoram has a short modern healthcare history compared with many Indian states looking at the temporal aspects of healthcare facility. Dispensaries and Primary Health Centres in Mizoram started as early as in 1890s when the British came to Mizoram and over the last two centuries it has undergone several changes to meet the increasing demand for healthcare services.

After attaining statehood in 1987 the emphasis was on the expansion of the healthcare establishment. However, it was realised that mere expansion of healthcare services across the state did not provide adequate facility. It required also sound geographical distribution of healthcare facilities, ideal location and population coverage of health centre and quality rather than quantity especially on healthcare services. It is also felt that ‘purely medical approaches are ineffective without social, economic, and political preconditions for good health’ (Lincoln C. Chen, MD December 7, 2004*)*. The failure of universal access to primary health care, especially for the poor, may be seen as a violation of human rights. Advancing health and human security may be seen as strengthening basic human rights, particularly women and children health is so critical.

Growth and development of modern healthcare system under government cannot be underestimated though the contributions of early Christian missionaries were commendable

on this regard. During that period Mizoram was under the state of Assam and in 1952 it attained the status of a District Council and in 1972 it got the status of a Union Territory. In 1987 Mizoram attained the status of statehood. Growth of healthcare during these periods was quite slow. This section briefly highlights the growth and development of healthcare facilities under the government initiative.

Attainment of statehood in 1987 appears to be positively associated with increasing hospital healthcare. By 2001 there were 7 hospitals in the state which increased to 8 by 2010, one each in the eight districts of Mizoram. There was enormous growth of hospital institution in the state after 2001 mainly because of the emergence of non-government hospital. Today there are 37 hospitals in the state. This is a reflection of progress and improvement in the field of medical among the Mizo. However, almost all these non-government hospitals are concentrated only in Aizawl reflecting inherent urban bias of private initiative. As of 2020, there are 13 Public Hospitals across various districts in the state. 1,478,146 patients were treated in Out Patient Department (OPD) in 2018-19 and 307,972 were treated in In Patient Department (IPD) respectively. The bed strength of Public Hospitals in Mizoram currently stood at 1366.

1.4: SIGNIFICANCE OF THE STUDY

Health economics has not been extensively studied at research level in Mizoram. As such, there have been only few studies regarding the provision of health facilities and its impact on the economy. Moreover, there has been no suitable study regarding patients' satisfaction and their willingness to pay for health and healthcare facilities.

Mizoram is one of the smallest states rampant with critical illness such as cancer, cardiovascular disease and other lifestyle related diseases such as diabetes and hypertension. Besides the social cost, a study of the economic cost of provision of health and healthcare facilities is one of the most important and much needed studies in economic literature. This research will also inquire about the nature of welfare economics and whether the provision of free and basic healthcare facilities to the population leads to welfare of the masses.

This research also aims at assessing delivery of health and healthcare facilities to patients in a public hospital. Also, the bahvioural pattern of the patients will be studied in order to elicit patients' satisfaction, perception and expectation with regard to the provision of healthcare services for the community at large.

1.5: CONCEPTUAL FRAMEWORK

In order to enrich the subject matter of this research, it is important to briefly elucidate about the conceptual framework—the theories and concepts that is used as the core of this research work.

In economics, the concept of welfare is used in a narrow sense: it is limited to only material economic welfare. Welfare Economics imparts economic science a normative character. It is the study of conditions that maximize economic welfare of society as a whole. In the words of Oscar Lange, "Welfare economics is concerned with the conditions which determine the total economic welfare of a community" (Lange, 1942). The function of welfare economics is to evaluate alternative economic situations and determine whether an economic situation yields greater economic welfare than others. Welfare economics may also be defined as that branch of economic science which evaluates alternative patterns of resource allocations from the viewpoint of maximizing economic welfare of the society as a whole (Graff, 1957).

Data envelopment analysis (DEA), introduced by Charnes et al., (1978), is an approach for identifying best practices among peer decision making units (DMUs) in the presence of multiple inputs and outputs. In many cases DMUs may consist of two-stage network structures with intermediate measures. In other words, DMUs under evaluation share a common feature found in many two-stage network structures, namely that outputs from the first stage become the inputs to the second stage. (Charnes, Cooper, & Rhodes, 1978) They are referred as intermediate measures. For example, Seiford and Zhu (1999) use a two-stage network structure to measure the profitability and marketability of US commercial banks. In their study, profitability is measured relative to labor and assets as inputs, and the outputs are profits and revenues. In the second stage, for marketability, the profits and revenue are then

used as inputs, while market value, returns and earnings per share constitute the outputs. (Seiford & Zhu, 1999). Zhu (2000) applies the same two-stage network structure to the Fortune Global 500 companies (Zhu, 2000).

In 1953 Sten Malmquist, a Swedish economist and statistician, published in Trabajos de Estadistica a quantity index for use in consumption analysis. The index uses input distance functions (gauge functions in mathematics) to compare two or more consumption bundles, and uses an indifference curve of one of the consumers as a reference set (Malmquist, 1953). Later Caves et al., (1982) (CCD) adapted Malmquist's idea to production analysis. They showed that, under certain market, technology and behavioral conditions, the geometric mean of a pair of adjacent-period Malmquist input (output) quantity indexes is equal to a Tornqvist (1936) input (output) quantity index (Caves, Christensen, & Diewert, 1982).

They also showed, under somewhat more restrictive behavioral conditions, that the geometric mean of a pair of adjacent-period Malmquist productivity indexes is equal to the product of a Tornqvist productivity index and a Tornqvist scale index. Thus, for a translog (a second-order Taylor series in the natural logarithms of the variables) approximation to the structure of production technology, and in the absence of increasing returns to scale, the geometric mean of two adjacent-period Malmquist productivity indexes can be calculated indirectly, using information on prices and quantities only.

This result holds for non-increasing returns to scale, because in this case the Tornqvist scale index, like the Tornqvist productivity index, can be calculated directly from price and quantity data. The virtue of this result is that the ‘theoretical’ Malmquist productivity index can be calculated indirectly, as the product of a Tornqvist productivity index and a Tornqvist scale index, without having to estimate the parameters describing the structure of the two underlying technologies (Tornquist, 1936).

Productivity growth has been of interests to researchers and policy makers since it is the engine which drives the economic prosperity, standards of living and the competitiveness of a country. Though various theories have been proposed for the explanation of productivity growth in developed and developing countries, two are of particular interest to the present

study. First, the convergence theory claimed that there is a general tendency for per capita income or total factor productivity (TFP) in low-income countries to converge towards those of high-income countries (Baumol, 1986).

The rationale behind this theory is based on the concept of diminishing returns to scale. As well demonstrated in the work of Solow, the capital-labor ratio in the developed countries is founded to be high in comparison to that of developing countries and therefore the marginal productivity of capital in them should be low. The contrasting viewpoint which embedded its rationale in the theory of endogenous growth states that per capita income or productivity of low and high-income countries stays constant or even diverges over time (Solow, 1956). The foundation of this theory lies in the concept of increasing return to scale. It was advocated by the pioneering work of Arrow and was further developed by Romer and Lucas that increasing returns to scale are generated from externalities associated with the acquisition of technical knowledge. According to endogenous growth theories, even if the individuals and firms face diminishing returns, spillover effect allows technical knowledge to diffuse and accrue to other firms and thus exhibits increasing return to scale at the aggregate level (Arrow, 1962) (Romer, 1986) (Lucas, 1988).

The inquiry of patients' satisfaction revolves around 5 dimensions used for measurement of service quality known as SERVQUAL instrument proposed by Parasuraman et. al., (1991). These dimensions are also called the RATER dimensions and consist of the following dimensions: The reliability dimension is related to the provision of services as promised, e.g., providing services effectively the first time and providing services at the right time. Security is the ability to infuse trust in customers and to make them feel secure in transactions. Tangible objects relate to physical conditions such as decoration, ambience and appearance at the place of service, appearance such as cleanliness and clothing of the staff and the use of clean modern equipment. Empathy means to best serve the interests of the customers and to understand the needs of the customers. Responsiveness means letting customers know when services are being provided and reflecting a willingness to help customers (Parasuraman, Zeithaml, & Berry, 1991).

1.6: OBJECTIVES OF THE STUDY

1. To study the institutional provision of public healthcare system in Mizoram
2. To highlight the trends and pattern of healthcare provision by Public Hospitals in recent years
3. To interpret the economic and financial benefits accruing to the beneficiaries of Public Hospitals' services when compared with their private sector counterparts
4. To show the trends in efficiency and productivity of various Public Hospitals in Mizoram
5. To find out the socio-economic conditions of healthcare beneficiaries of public hospitals in Mizoram
6. To determine the level of patients' satisfaction of public hospitals in Mizoram

1.7: HYPOTHESES

1. There is an increasing trend in monetary welfare (in terms of opportunity cost) accruing to beneficiaries of Public Hospitals in Mizoram over the years.
2. There is an increase in productivity and efficiency of Public Hospitals in Mizoram over the years.
3. There is widespread inequality (expressed in monetary income) among Public Healthcare beneficiaries in Mizoram.
4. There is a significant relationship between SERVQUAL dimensions and overall satisfaction of Public Healthcare beneficiaries in Mizoram.
5. There is a significant relationship between geographical dimensions and overall satisfaction of Public Healthcare beneficiaries in Mizoram.
6. There is a significant relationship between socioeconomic dimensions and overall satisfaction of Public Healthcare beneficiaries in Mizoram.

1.8: LIMITATIONS OF THE STUDY

1. The study covers only Public Hospitals as identified by the Government of Mizoram. Other lower levels of public health provisions such as Community Health Centre, Primary Health Centre and Health Sub-centres are not included in this study.
2. The study covers only 8 districts which are well-established and fully functional. Other three districts viz., Saitual, Khawzawl and Hnahthial are not considered since they are not yet fully functional during the study period, i.e., 2016-17 to 2020-21.
3. With the calculation of economic welfare provision, average cost is calculated based on the assumption that certain investigations and health care services such as x-ray, laboratory investigations, cost of major and minor operations etc. are the same throughout various Public Hospitals across Mizoram.

1.9: METHODOLOGY

The study is based on primary and secondary data. Secondary data is obtained from both published and unpublished sources like magazines, journals, e-resources, and books etc. for collecting necessary information especially from Health Directorate, Government of Mizoram. The data collected is analyzed using relevant and appropriate economic and statistical techniques.

For measuring economic welfare in monetary terms (express as opportunity cost), public cost and private cost across various Public Healthcare services are compared, viz., out-patient department consultation, in-patient stay and cost of various investigations and follow-up being done across various public hospitals in Mizoram. After the costs comparison are expressed in monetary terms, the real monetary welfare is obtained after the nominal monetary welfare is adjusted for inflation.

In the first stage, the actual cost of availing healthcare services is calculated, i.e., real money cost incurred by beneficiaries of public hospitals in Mizoram. Second, the opportunity cost is calculated, i.e., the cost that patients might have incurred had they avail healthcare services elsewhere like private healthcare providers. Then the opportunity cost is subtracted from the actual cost in order to extract the monetary compensation expressed as the difference

between opportunity cost and actual cost. Lastly, the monetary compensation is adjusted for inflation by taking into consideration the CPI inflation of the current period to find out whether there is a real increase in monetary compensation accruing to the beneficiaries of public hospitals in Mizoram over recent years, i.e., during the study period between 2016-17 and 2020-21.

Efficiency and productivity are calculated using output-oriented Malmquist Productivity Index (MPI) which is a variation of Data Envelopment Analysis (DEA) technique. Besides, relevant statistical techniques and data analysis software are employed for the analysis of secondary data. The details of the techniques employed are given in appendix-III.

A multi-stage cluster sampling procedure is used for the study. First, clustering the state of Mizoram into 8 districts, other 3 districts viz., Saitual, Khawzawl and Hnahthial are not included since they are not yet fully functional during the study period. In the second stage, all Public Hospitals across various districts are identified, totaling 11 hospitals. Third, sample size for each hospital is calculated in the districts identified in stage-I. In the fourth stage, the respondents are selected using a simple random technique of balloting without replacement. The detailed calculation of determination of sample size and the sampling procedure is shown in appendix-I.

Taro Yamane formula is used for determining the sample size which yields 420 patients or beneficiaries of Public Hospitals. Inequality among Public Healthcare beneficiaries is obtained using a general method of Gini Index calculation as shown in Appendix-IV. The time of visit to the selected hospitals is determined on random basis. Patients are selected from the hospitals at the time of the visit using the hospital register as a sampling frame. The structured interview schedule for this research follows the dimensions of the SERVQUAL instruments developed by Parasuraman et. al., (1991). Reliability of the structured interview schedule is verified using Cronbach's alpha, KMO and Bartlett's test.

This research primarily employed service gap model to assess the effective quality of the hospitals. The gap is defined between the expectation variable and the perception variable that forms the calculation (P-E=Service Quality Gap Score) (Parasuraman et. al., 1985).

Descriptive statistics are used to examine the demographic and socioeconomic profile of the respondents. For an inquiry of the relationship between the dimensions of SERVQUAL, geographical and socioeconomic conditions with customer satisfaction and word of mouth, independent samples Mann-Whitney U Test and independent samples Kruskal-Wallis Test are used.

CHAPTER II

REVIEW OF LITERATURE

2.1: INTRODUCTION

This chapter reviews the concept of analysis of efficiency and productivity through Data Envelopment Analysis as well as service quality, customer satisfaction and word-of-mouth from past literatures.

2.2: REVIEW OF LITERATURE

In the quest for designing a suitable methodology and framework to elicit service quality, Parasuraman et al., (1991) mentioned that SERVQUAL can be usefully combined with additional qualitative or quantitative analysis to examine the factors influencing the SERVQUAL study's main issue areas. SERVQUAL is a good starting point for measuring and optimizing service efficiency, but it's not considered to be the final solution. Its five-dimensional structure provides a useful tool for measuring and evaluating a company's service quality output over time and against competitors.

With regard to comparison between public and private hospitals, Al-Neyadi et al., (2016) finds that the relative quality of healthcare facilities is not substantially diverse. Patients' satisfaction with the quality of treatment rendered by doctors and nurses, as well as the quality of the hospital setting, did not differ substantially between public and private hospitals, beyond the fact that they were more satisfied with nursing care. The SERVQUAL dimension of certainty was ranked as the most important, while the SERVQUAL dimension of responsiveness was classified as the least important. In the United Arab Emirates, the SERVQUAL's five measurements proved to be a clear and accurate scale for assessing healthcare service efficiency.

Since our experience and interaction with healthcare service providers play a crucial role in our overall satisfaction and perception, Oswal et al., (2021) examined cancer patients' experience with caregiver, healthcare practitioners and healthcare system in Assam to identify potential areas for improvement in delivering high quality cancer care service. Their study finds that the patients are satisfied with the services of first consultation, pre-treatment and during treatment. Their study also examines into the requirements of the policy changes in terms of accessibility, affordability and psychosocial care, including counselling and financial support, to ensure better cancer care services.

A smooth flow of information between the principal and agent is a prerequisite for optimal outcome. In this context, a study by Grönroos (1993) states that an optimal technical standard is needed to ensure customer satisfaction. The communication process is critical to the quality of the system. Furthermore, customer-oriented physical and technological tools, as well as the firm's usability of services, the focus of self-service programmes, and the firm's capacity to establish direct interaction with its clients, are examples of ways to influence the practical quality variable, and the quality aspects of the service. Achieving suitable technological consistency is a requirement for achieving successful practical quality. On the other hand, if the practical standard is high enough, temporary issues with the technological quality may be overlooked. Finally, the significance of the image must be recognized.

Also, with regard to evaluation of patients' satisfaction, Butt et al., (2010) studied Malaysian healthcare sector and stated that SERVQUAL is a rigorous tool for evaluating Malaysian healthcare service providers. The findings have showed that on their respective scales, healthcare experience and expectation metrics are strongly correlated. Failure to achieve any particular indicator can result in a negative opinion of the service provider as a whole. The study expected to help private healthcare professionals start solving quality problems by measuring service quality gaps and taking corrective steps on a daily basis.

Patients' satisfaction plays a key role in the provision of public healthcare, Mahapatra et al., (2001) identified that Corruption by all categories of staff was the greatest cause for dissatisfaction, followed by general cleanliness, poor utilities etc. High level of dissatisfaction was noted regarding patient's assessment of technical quality of doctor's work and less time spent by the doctor with the patients, which are the main causes for people to go for private healthcare organizations, where majority of patients who come for treatment to public hospital are poor and illiterate.

In our modern society where ratings and reviews play a crucial role in economic transactions, the indispensable nature of its simplest form, i.e., word-of-mouth cannot be neglected, Burnham et al., (2018) found that customer satisfaction is positively correlated with positive-word-of-mouth (PWOM) and recommendation likelihood measures identify, or mediate, the impact of satisfaction on PWOM. Furthermore, their study found that word of mouth (WOM) opportunity is strongly correlated with PWOM and significantly increases

the probability of recommendation through PWOM (Buraham & Leary, 2018). Bone (1995) shows a number of techniques that managers should use to improve favourable views of their goods and services. First and foremost, managers must concentrate on the conversations that customers have when using a product or service. Effective listening may reveal to managers about many facets of the product and service that consumers consider "worthy" of discussion and constructive evaluation. Customers' conversations will then be guided to these subjects by employees. Managers will also choose to structure scenarios in-store that will "spark" word-of-mouth.

Sanjaya et al., (2018) studied on Sanglah Hospital Denpasar, Indonesia. Their findings stated that service quality have positive and significant effect to positive word of mouth, and service quality have positive and significant effect to consumer satisfaction. The study also finds that service quality has positive and significant effect to corporate image, and patient satisfaction have positive and significant effect to corporate image. Finally, the study concluded with the finding that positive word-of-mouth has positive and significant effect to corporate image.

A happy client and a loyal customer base are indispensable for the long-run survival of any business entity, Meesalaam and Paul (2018) try to identify the most critical factors related to customer satisfaction in hospitals that will affect its survival in the near future. Their study was based on data from 40 different private hospitals in Hyderabad, India, that treated clients. The factors examined for this study were tangibility, reliability, responsiveness, assurance, and empathy (service quality aspects), patient satisfaction, and hospital loyalty. Using structural equation models, the study finds that reliability and responsiveness are the key factors that affect customer satisfaction. It is also related with loyalty to the hospital but age and marital status has no effect on customer satisfaction. Naik et al., (2013) studies the impact of service quality and word-of-mouth on patients' satisfaction of private hospitals in Hyderabad, India, found that patients' satisfaction is influenced by the service quality provided by the hospital industry and suggested that hospitals should constantly conduct workshops and training programmes for employees to train them on interpersonal skills and relationship building which will ultimately lead to delighted consumers.

Moreover, according to the study conducted by Anderson (1998), disgruntled consumers are observed to spread more word-of-mouth than customers who are satisfied. His findings also highlighted that widespread of high level of negative WOM may be unwarranted by others and might not affect the reputation of the companies. However, it is evidently clear that negative word of mouth is spread with a greater force than positive word of mouth.

DEA has been used widely to estimate technical efficiency of hospital services and several studies have reviewed the literature on the application of DEA in general (Emrouznejad et al., 2008, Gattoufi et al., 2004, Seiford, 1997) and on efficiency measurement using non-parametric and parametric applications within health care in particular (Hollingsworth et. al., 1999, Hollingsworth, 2003 and O'Neill et al., 2008). O'Neill et al. (2008) identified how model specification has changed over time with respect to changes in hospital financing. However, most of the earlier studies have focused on specific characteristics or types of hospital rather than the impact of technology and environment on hospital efficiency. In estimating technical efficiency of hospital services a few studies have undertaken sensitivity analysis (Ozcan, 1992-1993; Parkin and Hollingsworth, 1997) or applied bootstrapping (Efron and Tibshirani, 1993) techniques to improve the reliability of estimated results. A study (McGlynn et al., 2008) based on the review of 158 articles on health care efficiency in the USA showed that the number of articles that examined the sensitivity of their findings is surprisingly low. Only four out of 158 articles attempted to estimate the reliability and/or validity of the measures used. In reviewing non-parametric and parametric applications, Hollingsworth (2003) also concluded that "little sensitivity analysis or statistical testing has been undertaken, even though these advanced methods are under development".

Also, in analyzing the productivity of Hospitals' laboratory, Feizollahzadeh et al., (2020) evaluated the economic efficiency of hospitals' laboratory units affiliated to Urmia University of Medical Sciences (UMSU), Iran, in order to assess their performance. Their research was a descriptive-analytic study that was accomplished in 2017. In analyzing the data, they employed DEA method and Deap 2.1 software. They found that economic efficiency of clinical laboratories calculated by DEA in 2017 was 0.676 which was lower

than the allocative and technical efficiency scores, indicating that these units could attain full efficiency by reducing their costs without having any effect on output values. Their study concludes that it is necessary for the laboratory managers to consider optimum allocating of resources, with respect to the cost of laboratory equipment and inputs in order to increase their units' economic efficiency.

Grosskopf (1996) provided a selective survey of statistical inference in nonparametric, deterministic, linear programming-based frontier models. A few recent empirical examples include a recent study by Halsteinli et al., (2010) on Norwegian outpatient child and adolescent mental health services. They used bootstrapping procedures to calculate confidence intervals and to test alternative specifications of output. Blank and Valdmanis (2010) applied Simar and Wilson's (2007) bootstrapping technique in order to obtain more efficient estimates of environmental effects on Dutch hospital performance. Garcia-Lacalle and Martin (2010) applied the Mann-Whitney U test and multidimensional scaling techniques to study differences in efficiency and perceived quality scores between rural and urban hospitals. Several studies have used the Malmquist Productivity Index to measure efficiency and technical changes of hospital services. The Malmquist index (Malmquist, 1953) was first proposed by Malmquist in the context of consumer theory and was further developed by Caves et al., (1982) and others in the context of productivity measurement. The MPI methodology has been employed widely in the literature, in part because it can be applied with quantity information and it requires neither relative price information (which is often not available in public hospital sectors that provides variety of services under a global budget) nor restrictive behavioral assumptions in its estimation. The MPI measures total factor productivity (TFP) growth of a decision-making unit (e.g., hospital). It reflects progress or regress in efficiency along with progress or regress of the frontier technology over time in the context of multiple inputs and multiple outputs. This has made it particularly well suited to analysis of hospital data.

Using an input-based Malmquist index, Sommersgutter-Reichmann (2000) studied changes in productivity in the provision of hospital care in Austria between 1994 and 1998. The author found a considerable positive shift in hospital technology between 1996 and 1998 with no enhancement in technical efficiency. Using two different approaches for output

measurement, another study (Hofmarcher et al., 2002) on Austrian hospitals found that on average, efficiency scores varied between 70 percent and 90 percent over the period 1994-1996. Applying the Malmquist index, Luoma and Jarviö (2000) found that productivity growth occurred in Finish health centers at the same time as the state and municipalities experienced severe financial difficulties due to a severe recession and falling tax revenues. Investigating the impact of the subsidy reform in Finland over the same period, Linna (1998) concluded that the reform did not have a significant impact on productivity growth.

Efficiency gains were found following changes in hospital financing for several other countries including Spain (Gonzalez Lopez-Valcarcel and Barber Perez, 1996) and Norway (Biørn et al., 2003). A study based on 75 Scottish acute hospitals from 1991/1992 to 1995/1996 (Maniadakis et al., 1999), noted that productivity changes were dominated by technological change with little change in hospital efficiency. Fare et al., (1994) investigated 17 Swedish hospitals and found a wide variation in performance during the period 1970-1985. They found that long-term average annual productivity growth was negative for 13 of 17 hospitals. They concluded that 13 of 17 hospitals experienced annual technical regress and only five out of 17 exhibited average annual gains in efficiency. Ferrier and Valdmanis (2008) studied efficiency and productivity changes in large urban hospitals in the USA and found that from 1994 to 2002 hospitals made modest gains in their economic performance by improving their technical efficiency and by adopting more productive technologies. Burgess and Wilson (1995) examined US hospitals from 1985 to 1988 and found that changes in technology dominated changes in inefficiency in determining changes in productivity. McCallion et al., (2000) studied hospitals in Northern Ireland from 1986 to 1992 and found that technological improvement was outweighed by a decline in efficiency change for small hospitals and that scale efficiency declined.

With regard to productivity and efficiency, Alatawi et al., (2020) assessed the performance of public hospitals in Saudi Arabia by employing Data Envelopment Analysis (DEA) to measure the technical efficiency of 91 public hospitals. Their assessment included four inputs, and six output variables taken from the Ministry of Health databases for 2017. They conducted the assessment via PIM-DEA V.3.2 software. Their findings identified 69 out of 91 public hospitals as technically inefficient. The average efficiency score was 0.76,

indicating that hospitals could have reduced their inputs by 24 percent without reduction in health service provision. Their study concludes by stating that most hospitals were technically inefficient and operating at suboptimal scale size and indicate that many hospitals may improve their performance through efficient utilization of health resources to provide the current level of health services.

It is a truism that a strong political will is the prerequisite for any reform policy, Twose et al., (2004) comments that the 'Thai Policy' is a bold reform driven by top level political imperatives and incorporating many innovative features which include allowing greater patient choice and expanding the sources of finance beyond general taxation. Also, Toth (2013) highlights that in the period from 1945 to 2000, those countries where political power was more concentrated implemented a national health service. Conversely, those countries where political power was more dispersed tended to maintain a system of voluntary or social health insurance.

Health indicators in India may have seen substantial improvements in recent decades but quality and affordable health care services continue to elude the poor, Acharya *et. al.* (2005) suggests that community-based health insurance (CBHI) schemes could provide viable alternatives which are sustained by a pooling of resources as well as the regular "prepayment" of a small amount as premium (Acharya & Ranson, 2005). Bhat et al., (2006) highlights that financing of healthcare through public and/or private channels are one important component of this strategy. Their study examines the relationship between income and public and private healthcare expenditures.

Since the financial cost of healthcare is an important factor with respect to access to healthcare facilities, Yadav (2007) in a cross sectional study conducted at the Government Medical College Hospital, shows that owing to inflation and rising costs of commodities, some people from the upper middle class can no more afford the costs incurred in the private medical sector and have to therefore seek medical services of a government hospital. (Yadav, 2007) Also, there exists a significant difference between rural and urban areas regarding the cost and availability of healthcare services, Berman et al., (2010) indicates that health expenditure related impoverishment in India is quite high. Rural rates are higher than urban

and outpatient services account for a much larger share of the financial burden on households than inpatient services.

Moreover, morbidity and its treatment can be potentially burdensome or even catastrophic for poor households, Chowdhury (2011) argues that treatment cost incurred on ailments not requiring hospitalisation is also a substantial burden on the urban poor. Based on his case study of 150 slum households in south Delhi, he concludes that there is a need for a more holistic approach in social safety nets like the RSBY, and for explicitly including uncovered healthcare payments in measurement of the poverty lines for a more accurate estimation of the marginalized.

It is a well-known fact that the existing healthcare provisions have many loopholes and drawbacks; the need for improvement is a global phenomenon, Willis et al., (2009) has outlined key dimensions of health sector reform which are often bundled together under the heading of 'neo liberalism'. The reform policies and processes experienced in both Latin America and sub-Saharan Africa share some characteristics, most notably a reduction in state provision of health care, growing private sector healthcare and health insurance services. They conclude their study by stating that challenges of implementing such policies and ensuring social equity remain significant. Rego et al., (2010) points out that the inability of traditional state organisations to respond to new economic, technological and social challenges and the associated emerging problems has made it necessary to adopt new methods of health management. The results seem to suggest that the introduction of market processes and changes in organisational structure such as managerial autonomy and corporatisation of public hospitals have had a positive impact on Portuguese public hospitals.

2.3: RESEARCH GAP

The above reviews of literature mainly stress on the impact of healthcare on patients' satisfaction and the linkage between income and the types of hospital that a patient uses. But to the farthest extent, most of the literature reviews do not inquire about the correlation between healthcare provision and welfare. This research will try to fill the gap that exists regarding the provision of healthcare for the welfare of the society and the efficiency and productivity of Public Healthcare provision in the study area.

CHAPTER III

TRENDS AND PATTERN ANALYSIS AND INSTITUTIONAL PROVISION

3.1: INTRODUCTION

This chapter adumbrates the various trends and pattern of healthcare expenditure, provision and services at large. In other words, it highlights the institutional provision of hospitals, the amount of monetary expenditure being allocated or incurred as compared to the other sectors of the economy. The first section (i.e., Section–A) of this chapter elucidates the overview of healthcare expenditure across various geographical regions of the world. In Section–B, a brief overview of healthcare expenditure in India is depicted. The succeeding section (i.e., Section–C) highlights the trends and pattern of healthcare services being provided by Public Hospitals in Mizoram. Finally, the last Section (i.e., Section–D) illustrates a brief comparison of Public and Private Hospitals' performance in Mizoram.

3.2: SECTION–A: A Brief Overview of Healthcare Expenditure Across the Globe

In this section, healthcare expenditure as a share of GDP is highlighted across countries and geographical regions. The following tables highlight the current healthcare expenditures at large across the globe.

Table 3.1: Current Health Expenditure (as a percentage of GDP) and Per Capita Worldwide

Year	*Percentage of GDP*	*Per Capita (Current USD)*	*Per Capita (PPP)*
2015	9.793	993.983	1257.441
2016	9.878	1015.875	1301.970
2017	9.782	1056.571	1345.746
2018	9.723	1103.362	1407.345
2019	9.845	1121.796	1466.805

Source: WHO Global Health Report, 2021

The above table (i.e., table 3.1) shows the current healthcare expenditure as a percentage of GDP worldwide. It can be seen that the share of healthcare expenditure in GDP has been stagnating below 10 percent. At the same time, the per capita expenditure on healthcare has been increasing gradually year by year.

3.2.1: Current Health Expenditure in SAARC Countries

Table 3.2: Current Health Expenditure (as a percentage of GDP) in SAARC Countries							
Sl. No.	**Name of the Country**	**2015**	**2016**	**2017**	**2018**	**2019**	**Total**
1	India	3.596	3.504	2.936	2.952	3.104	3.218
2	Pakistan	2.687	2.893	2.902	3.202	3.380	3.012
3	Sri Lanka	3.890	3.864	3.596	3.912	4.080	3.868
4	Bangladesh	2.639	2.473	2.432	2.508	2.484	2.507
5	Bhutan	3.757	3.576	3.341	3.243	3.608	3.505
6	Afghanistan	10.105	11.819	12.621	14.127	13.242	12.382
7	Maldives	8.690	10.281	9.241	7.652	8.040	8.780
8	Nepal	5.466	5.424	4.722	4.528	4.445	4.917
	Total	5.103	5.479	5.223	5.265	5.297	3.295

Source: WHO Global Health Report, 2021

The above table (i.e., table 3.2) shows the current health expenditure in SAARC countries. It can be seen that the total health expenditure as a percentage of GDP has been stagnating over the years and well below the global average. India has been spending below 5 percent of its GDP over the years and actually decreases from 3.596 and 3.504 percent in 2015-16 to 2.952 and 3.104 in 2.018-19. Bangladesh has the lowest health expenditure with 2.507 percent of its GDP from 2015-19 among the SAARC countries. Pakistan, Sri Lanka, Bhutan and Nepal are in the median group with 3.012, 3.868, 3.505 and 4.917 percent of their GDP during 2105-19. Maldives and Afghanistan have the highest health expenditure with 8.780 and 12.382 percent of their GDP during 2015-19. Only Afghanistan has health expenditure higher than the global average with an average of 12.382 percent of its GDP during 2015-19. The total average health expenditure of SAARC countries is highest in 2016 with 5.479 percent of GDP and lowest in 2019 with barely 3.295 percent of GDP.

Table 3.3: Current Per Capita Health Expenditure (Current USD) in SAARC Countries							
Sl. No.	**Name of the Country**	**2015**	**2016**	**2017**	**2018**	**2019**	**Total**
1	India	58.917	60.603	57.557	60.266	63.748	60.218
2	Pakistan	35.981	39.426	42.257	42.873	39.499	40.007
3	Sri Lanka	149.963	151.475	148.789	162.108	160.697	154.606
4	Bangladesh	32.849	34.569	34.407	41.904	45.857	37.917
5	Bhutan	98.562	98.905	104.855	102.739	115.981	104.208
6	Afghanistan	58.907	60.189	65.706	69.999	65.806	64.121
7	Maldives	785.032	946.811	885.084	786.438	854.371	851.547
8	Nepal	47.888	48.319	50.311	51.136	53.246	50.18
	Total	158.512	180.037	173.620	164.682	174.900	170.35

Source: WHO Global Health Report, 2021

The above table (i.e., table 3.3) shows the current health expenditure expressed in current USD among the SAARC countries. It can be seen that the per capita health expenditure is way below the global average. India spends barely 60.218 USD over five years (2015-19) but it shows an increasing trend over the years being mentioned. Sri Lanka, Bhutan and Maldives has the highest per capita average health expenditure with 154.606, 104.208 and 851.547 USD over the five-year period (2015-19). Bangladesh has the lowest average per capita health expenditure with a modicum amount of 37.917 USD during 2015-19.

Pakistan, Nepal and Afghanistan also have an average per capita health expenditure below 100 USD with 40.007, 64.121 and 50.180 over the recorded period, i.e., 2015-19. The total average per capita health expenditure among the SAARC countries during 2015-19 is 170.350 USD which is drastically below the global average. The year 2016 marks the highest average per capita health expenditure with 180.037 USD and the lowest being 2015 with 158.512 USD.

Table 3.4: Current Per Capita Health Expenditure (PPP) in SAARC Countries							
Sl. No.	**Name of the Country**	**2015**	**2016**	**2017**	**2018**	**2019**	**Total**
1	India	196.498	204.647	181.529	195.565	211.002	197.848
2	Pakistan	117.508	127.576	132.67	155.462	165.551	33.11
3	Sri Lanka	450.910	476.460	459.247	523.521	569.573	495.942
4	Bangladesh	93.847	95.181	101.18	114.091	123.287	105.517
5	Bhutan	340.187	352.925	355.488	368.223	432.135	369.791
6	Afghanistan	211.587	234.140	259.789	294.309	285.558	257.076
7	Maldives	1457.258	1790.039	1668.807	1473.384	1639.800	1605.857
8	Nepal	163.778	162.154	168.339	171.207	176.955	168.486
	Total	378.946	430.39	415.881	411.97	450.482	417.539

Source: WHO Global Health Report, 2021

The above table (i.e., table 3.4) shows the current per capita health expenditure expressed in purchasing power parity (PPP). India's per capita health expenditure in PPP shows a gradual increase during the first two years but declined in the succeeding years– 196.498 and 204.647 USD in 2015 and 2016 but declined to 181.529 and 195.565 USD in 2018 and 2019; but in 2019 it starts to increase again with 211.002 USD. The average total per capita health expenditure expressed in PPP for India is 197.848 during 2015-19. Sri Lanka, Bhutan and Maldives have an average per capita health expenditure in PPP with 495.942, 369.791 and 1605.857 USD over the five-year period of 2015-19. Pakistan has the lowest average per capita health expenditure in PPP with a picayune amount of 33.11 USD during 2015-19. Bangladesh, Afghanistan and Nepal have an average per capita health expenditure in PPP with 105.517, 257.076 and 168.486 USD respectively during 2015-19. The average total per capita health expenditure among the SAARC countries during 2015-19 is 417.539 USD.

3.3: SECTION–B: Current Health Expenditure and Per Capita in India

The following table highlights the current health expenditure as well as the per capita spending on healthcare in India:

Table 3.5: Current Health Expenditure (as a percentage of GDP) and Per Capita in India

Year	*Percentage of GDP*	*Per Capita (Current USD)*	*Per Capita (PPP)*
2015	3.596	58.917	196.498
2016	3.504	60.603	204.647
2017	2.936	57.557	181.529
2018	2.952	60.266	195.565
2019	3.104	63.748	211.002

Source: WHO Global Health Report, 2021

The above table (i.e., table 3.5) shows the current health expenditure as a share of GPD as well as per capita health expenditure expressed in current and PPP USD in India. The share of health expenditure has been increasing in the first year but declined in the succeeding three years with 3.596 percent in 2015 and 3.504, 2.936 and 2.952 percent in 2016, 2017 and 2018. Meanwhile, the per capita health expenditure shows a gradual increase over the years except one year with 58.917 and 60.603 USD in 2015 and 2016 that decline to 57.557 USD in 2017; then it starts to increase yet again with 60.266 and 63.748 USD in 2018 and 2019.

On the other hand, the per capital health expenditure expressed in PPP shows a cyclical ups and downs with an increasing trend in the first two years with 196.498 and 204.647 USD in 2015 and 2016, then declines to 181.529 and 195.565 USD in 2017 and 2018; but since its first two fluctuated years it shows an increasing trend again with 211.002 USD in 2019. It can be further claimed that during the period being mentioned, i.e., 2015-19, India's health expenditure as a share of GDP as well as per capita has been stagnant with both figure way below the global average.

Table 3.6: Total State Expenditure and Health Expenditure of North-East States in 2015-16					
Sl. No.	**Name of the State**	**Population (in Crores)**	**Total State Expenditure (in Crores)**	**Total State Expenditure on Health (in Crores)**	**Health Expenditure as a % of Total State Expenditure**
1	Mizoram	0.11	7731	645	8.34%
2	Arunachal Pradesh	0.13	11740	673	5.73%
3	Manipur	0.26	9841	536	5.45%
4	Meghalaya	0.28	9253	623	6.73%
5	Assam	3.23	70428	4992	7.09%
6	Nagaland	0.24	10156	588	5.79%
7	Sikkim	0.06	5431	308	5.66%
8	Tripura	0.38	12537	829	6.62%
	Total	4.69	137117	9194	6.70%

Source: Central Bureau of Health Intelligence: National Health Profile, 2020

The above table (i.e., table 3.6) show the total state expenditure and health expenditure among the North-East states of India. Mizoram has the highest health expenditure as the share of its total expenditure with 645 crores out of 7731 crores INR being spent on health in 2015-16. Also, Mizoram has the highest health expenditure as a percentage of its total state expenditure with 8.34 percent among the North-East states of India. The absolute highest health expenditure as well as state total expenditure among the North-East is the state of Assam with 4922 crores out of 70428 crores INR being spent in health which is 7.09 percent of its total state expenditure in 2015-16.

Manipur has the lowest health expenditure as a share of its total state expenditure with 536 crores out of 9841 crores INR being spent on health in 2015-16 which is 5.45 percent of its total state expenditure. Arunachal Pradesh, Nagaland and Sikkim spend below 6 percent of its total state expenditure on health with 5.73, 5.79 and 5.56 percent while Meghalaya and Tripura spend 6.73 and 6.62 percent respectively. The total state expenditure on health among the North-East states is 9194 crores INR which amounts to 6.70 percent of its total state expenditure of 137117 crores INR with a population of 4.69 crores.

Table 3.7: Per Capita Health Expenditure and Health Expenditure as a percentage of GSDP in 2015-16				
Sl. No.	**Name of the State**	**Per Capita Health Expenditure (Expressed in Rupees)**	**GSDP at Current Price (Rupees in crores)**	**Health Expenditure as a percentage of GSDP**
1	Mizoram	5862	15339	4.20%
2	Arunachal Pradesh	5177	20433	3.29%
3	Manipur	2061	19233	2.79%
4	Meghalaya	2223	25967	2.40%
5	Assam	1546	226276	2.21%
6	Nagaland	2450	19816	2.97%
7	Sikkim	5126	16954	1.81%
8	Tripura	2183	34368	2.41%
	Total	26628	378386	2.42%

Source: Central Bureau of Health Intelligence: National Health Profile, 2020

The above table (i.e., table 3.7) shows the per capita health expenditure as well as health expenditure as a share of GSDP in 2015-16. Mizoram has the highest per capita health expenditure among the North-East states with 5862 INR which is equal to 4.20 percent of its GSDP of 15339 crores INR in 2015-16. Assam has the lowest per capita health expenditure with only 1546 INR which is equal to barely 2.21 percent of its GSDP of 226276 crores INR in 2015-16. On the other hand, Sikkim has the lowest health expenditure as a share of its GSDP with 1.81 percent of 16954 crores INR in 2015-16; but its per capita health expenditure is higher than Assam with 5126 INR.

Manipur, Meghalaya, Nagaland and Tripura spend below 3 percent of their GSDP on health with 2.79, 2.40, 2.97 and 2.41 percent while Arunachal Pradesh spends 3.29 percent in 2015-16. The total per capita health expenditure among the North-East states is 26628 INR in 2015-16 and the total health expenditure as a share of GSDP is barely 2.42 percent out of 378386 crores INR expressed in current price.

3.4: SECTION–C: Trends and Pattern of Public Hospitals' Services in Mizoram

In this section, the institutional provision of Public Hospitals in Mizoram is analyzed at large. The types of healthcare services being provided in broadly classified into three categories, viz., Out Patient department (OPD), In Patient Department (IPD) and Investigation and follow-up. The first sub-section pertains to the Out Patient Department's institutional provision and performance, the second sub-section deals with In Patient Department's institutional provision and performance, the last sub-section of this section highlights the trends in Investigation and follow-up that have been done at various Public Hospitals in Mizoram.

3.4.1: Out Patient Department

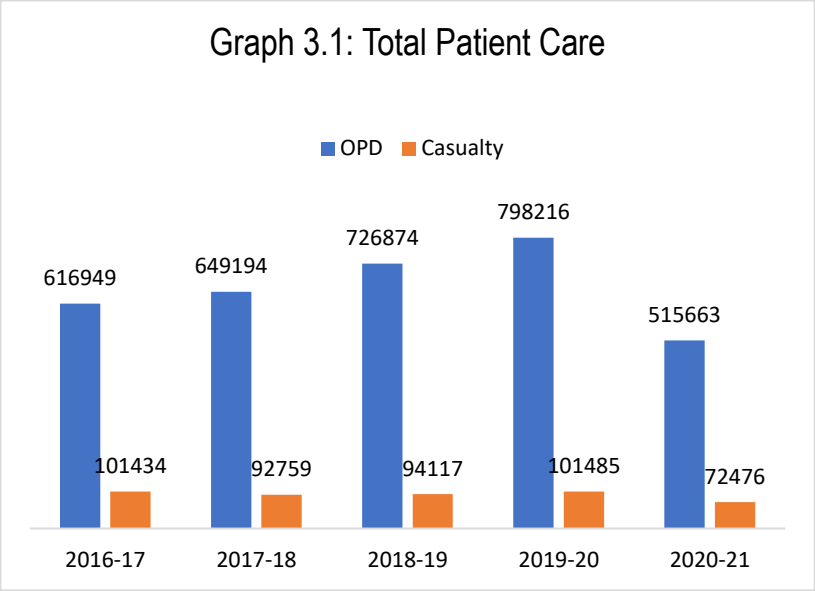
The following tables describes the trends, pattern as well as performance and institutional provision of Out Patient Department (OPD) across various Public Hospitals in Mizoram:

Sl. No.	Name of the Hospital	Table 3.8: Total Patient Care										
		OPD					*Casualty*					*Total*
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	*2016-17*	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Civil Hospital, Aizawl	359148	339688	349885	400792	273875	57418	48794	45086	46268	30643	1951597
2	Kulikawn Hospital	10762	11198	16991	19587	12902	308	580	208	608	709	73853
3	Civil Hospital, Lunglei	77117	79255	87417	103823	72527	11285	10572	10964	11425	10918	475303
4	District Hospital, Champhai	21812	27252	31760	28657	38120	3168	4775	4141	4936	3995	168616
5	District Hospital, Serchhip	23154	25409	31538	29677	19896	5549	6560	6447	6294	5486	160010
6	District Hospital, Siaha	19360	26445	21205	26335	20163	7196	3807	3282	3727	3916	135436
7	District Hospital, Kolasib	35360	36286	37543	35956	25400	7777	8663	10800	12434	8862	219081
8	District Hospital, Mamit	14613	18287	20203	21160	14535	2597	1370	1414	2699	2822	99700
9	District Hospital, Lawngtlai	16135	23643	26413	23112	17524	2044	2501	3396	4405	3109	122282
10	Regional Cancer Centre	9877	12018	11953	11331	6616	0	0	0	0	2016	53811
11	Referral Hospital, Falkawn	29611	49713	91966	97786	14105	4092	5137	8379	8689	0	309478
	Total	616949	649194	726874	798216	515663	101434	92759	94117	101485	72476	3769167

Source: Hospital Statistics 2016-21, Directorate of Hospital & Medical Education, Govt. of Mizoram

The above table (i.e., table 3.8) shows the total patient care being done at various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest OPD as well as Casualty patients throughout the study period, i.e., 2016-21 with a total out-patient care (OPD and Casualty) of 1951597 during this period. Kulikawn Hospital has the lowest OPD and Casualty patient care with 73853 total patient care during 2016-21. Besides Kulikawn Hospital, only Regional Cancer Centre and District Hospital, Mamit record a total patient care less than 100,000 with 53811 and 99700 respectively during 2016-21. District Hospital, Champhai, Serchhip, Siaha and Lawngtlai have a total patient care of more than 100,000 but less than 200,000 with 168616, 160010, 135436, 122282 respectively.

Civil Hospital, Lunglei records the second highest total patient care with 475303 total patient care followed by Referral Hospital, Falkawn and District Hospital, Kolasib with a total patient care of 309478 and 219081 respectively during 2016-21. The total OPD care is highest in 2019-20 with 789216 total patient care and lowest in 2020-21 with a total patient care of 515663 between 2016 and 2021. The trend in OPD care has been increasing gradually with a sharp decline in the last year of the study period. The total Casualty care or treatment is highest in 2018-19 with 101485 patient care and lowest in 2020-21 with a total patient care of only 72467 between 2016 and 2021. The total recorded patient care during the study period (i.e., 2016-21) is 3769167.



The above figure (i.e., Graph 3.1) highlights the trend in total patient care in OPD and Casualty during the year 2016-21. The trend in OPD care has been increasing gradually with a sharp decline in the last year of the study period.

Sl. No.	Name of Hospital	Table 3.9: Bed Strength				
		2016-17	2017-18	2018-19	2019-20	2020-21
1	Civil Hospital, Aizawl	257	269	270	273	305
2	Kulikawn Hospital	50	50	50	50	50
3	Civil Hospital, Lunglei	120	150	150	160	180
4	District Hospital, Champhai	60	75	75	85	111
5	District Hospital, Serchhip	60	60	60	60	60
6	District Hospital, Siaha	45	45	45	45	100
7	District Hospital, Kolasib	60	60	60	60	60
8	District Hospital, Mamit	30	30	30	30	30
9	District Hospital, Lawngtlai	30	30	34	34	35
10	Regional Cancer Centre	50	50	50	50	50
11	Referral Hospital, Falkawn	159	205	267	290	236
	Total	921	1024	1091	1137	1217

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.9) shows the bed strength of various Public Hospitals across the state of Mizoram. It can be seen that Civil Hospital, Aizawl has the highest bed strength among the Public Hospitals in Mizoram with a gradual increase in the number of beds over the years from 257 in 2016-17 to 305 in 2020-21. Kulikawn Hospital, District Hospital, Serchhip, District Hospital, Kolasib, District Hospital, Mamit and Regional Cancer Centre have a constant bed strength over the years with 50, 60, 60, 30 and 50 respectively from 2016-21. The second highest bed strength is recorded by Referral Hospital, Falkawn with 159 in 2016-17 to 236 in 2020-21 followed by Civil Hospital, Lunglei with 120 in 2016-17 to 180 in 2020-21.

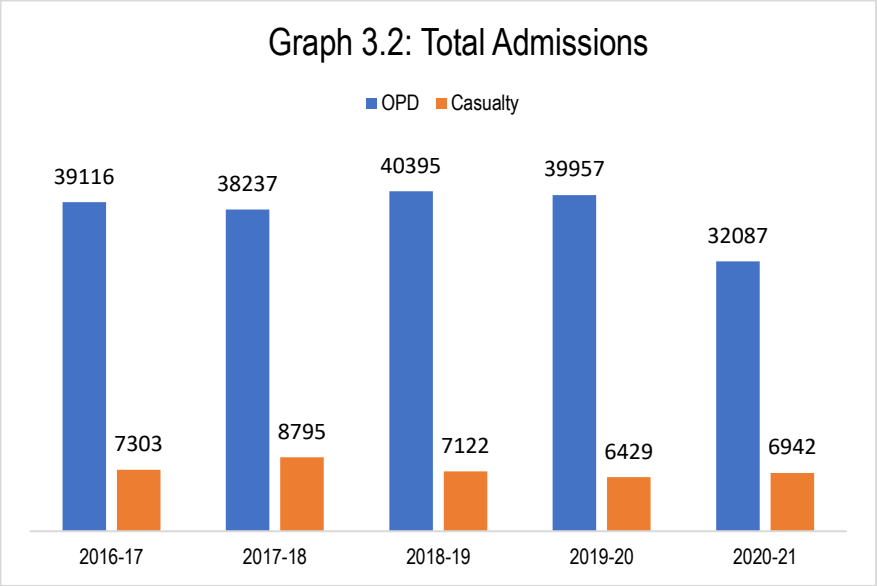
The number of beds in District Hospital, Siaha has been stagnating in first four years, i.e., 45 beds in 2016-20 but increased sharply in 2020-21 to 100 beds, which is the highest rate of increase recorded among Public Hospitals in Mizoram. District Hospital, Champhai shows gradual increase in bed strength over the years with 60 beds in 2016-17 to 85 beds in 2019-20 to 111 beds in 2020-21. Among the bed strength which shows an increase, District Hospital, Lawngtlai records the lowest rate of increase with 30 beds in 2016-17 to 34 beds in 2019-20 but only 35 beds in 2020-21. Over the years, the total number of bed strength in various Public Hospital in Mizoram has been increasing with 921 beds in 2016-17 to 1217 beds in 2020-21.

Sl. No.	Name of the Hospital	Table 3.10: Total Admission										
		OPD					*Casualty*					*Total*
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	*2016-17*	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Civil Hospital, Aizawl	13774	12345	12816	12879	11975	1338	2224	1065	982	2374	71772
2	Kulikawn Hospital	1075	864	1135	1073	667	49	111	70	61	53	5158
3	Civil Hospital, Lunglei	4941	5013	4123	4300	3624	1426	1343	1344	1092	518	27724
4	District Hospital, Champhai	2332	2218	2570	2640	4119	1157	1472	1390	1724	1675	21297
5	District Hospital, Serchhip	1962	2738	2797	2418	1886	411	433	463	390	450	13948
6	District Hospital, Siaha	2795	2742	1757	1786	2098	525	424	205	178	256	12766
7	District Hospital, Kolasib	3668	3553	3492	3424	2980	593	741	745	704	636	20536
8	District Hospital, Mamit	1360	1718	1765	1610	1202	288	311	284	288	245	9071
9	District Hospital, Lawngtlai	1238	1209	1612	1781	1106	750	587	674	629	650	10236
10	Regional Cancer Centre	1294	1027	1234	1237	792	0	0	0	0	83	5667
11	Referral Hospital, Falkawn	4677	4810	7094	6809	1638	766	1149	882	381	2	28208
	Total	39116	38237	40395	39957	32087	7303	8795	7122	6429	6942	226383

Source: Hospital Statistics 2016-21, Directorate of Hospital & Medical Education, Govt. of Mizoram

The above table (i.e., table 3.10) shows the total admission in various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest admission (OPD and Casualty) throughout the study period, i.e., 2016-21 with a total admission (OPD and Casualty) of 71772 during this period. Kulikawn Hospital has the lowest total admission (OPD and Casualty) with 5158 admissions during 2016-21. Besides Kulikawn Hospital, only Regional Cancer Centre and District Hospital, Mamit record a total admission less than 100,000 with 5667 and 9071 respectively during 2016-21. District Hospitals, Serchhip, Siaha and Lawngtlai have a total admission (OPD and Casualty) of more than 10,000 but less than 20,0000 with 13948, 12766 and 10236 respectively.

Referral Hospital, Falkawn records the second highest admission (OPD and Casualty) with 28208 total admission followed by Civil Hospital, Lunglei, District Hospital, Champhai and Kolasib with a total admission of 27724, 21297 and 20536 respectively during 2016-21. The total OPD admission is highest in 2018-19 with 40395 admissions and lowest in 2020-21 with a total admission of 32087 between 2016 and 2021. The trend in OPD care has been increasing gradually during the first three years, a slight dip in the penultimate year and a sharp decline in the last year of the study period. The total admission through Casualty highest in 2017-18 with 8795 admissions and lowest in 2019-20 with a total admission of only 6429 between 2016 and 2021. The total recorded admissions during the study period (i.e., 2016-21) is 226383.



The above figure (i.e., Graph 3.2) highlights the trend in total admissions (OPD and Casualty) during the year 2016-21. The trend in OPD care has been increasing gradually during the first three years, a slight dip in the penultimate year and a sharp decline in the last year of the study perio

Sl. No.	Name of the Hospital	Table 3.11: Operations Done										
		Major					*Minor*					*Total*
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	*2016-17*	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Civil Hospital, Aizawl	6886	6669	6589	6499	5273	11579	10560	11138	9737	6918	81848
2	Kulikawn Hospital	14	0	3	0	102	82	78	113	59	1511	1962
3	Civil Hospital, Lunglei	962	1029	1032	1070	956	4565	4328	4206	2358	1894	22400
4	District Hospital, Champhai	135	269	237	241	355	187	326	394	503	511	3158
5	District Hospital, Serchhip	43	212	309	356	245	1924	2373	2504	2281	1722	11969
6	District Hospital, Siaha	236	221	212	228	243	542	645	607	852	643	4429
7	District Hospital, Kolasib	226	353	405	484	437	2712	2693	1936	1707	1599	12552
8	District Hospital, Mamit	32	8	17	36	53	1487	141	559	93	354	2780
9	District Hospital, Lawngtlai	13	82	116	94	137	448	719	447	307	184	2547
10	Regional Cancer Centre	0	0	0	0	0	0	0	0	0	51	51
11	Referral Hospital, Falkawn	1424	1543	2697	3158	54	4563	3452	4609	6039	14	27553
	Total	9971	10386	11617	12166	7855	28089	25315	26513	23936	15401	171249

Source: Hospital Statistics 2016-21, Directorate of Hospital & Medical Education, Govt. of Mizoram

The above table (i.e., table 3.11) shows operations done in various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest operations done throughout the study period, i.e., 2016-21 with a total operation (Major and Minor) of 81848 during this period. Regional Cancer Centre has the lowest operations done (Minor only) with 51 minor operations done during 2016-21. Besides Regional Cancer Centre, only Kulikawn Hospital records total operations done less than 2000 with 1962 during 2016-21. District Hospitals, Champhai, Siaha, Mamit and Lawngtlai have total operations (Major and Minor) less than 5000 with 3158, 4429, 2780 and 2547 respectively.

Referral Hospital, Falkawn records the second highest total operations done (Major and Minor) with 27553 total operations done followed by Civil Hospital, Lunglei, District Hospitals, Kolasib and Serchhip with total operations done of 22400, 12552 and 11969 respectively during 2016-21. The total Major operations is highest in 2019-20 with 12166 operations done and lowest in 2020-21 with total operations of 7855 between 2016 and 2021. The trend in Major operations done has been increasing gradually but declines sharply in the last year of the study period. The total Minor operations done is highest in 2016-17 with 28089 operations and lowest in 2020-21 with a total operation of only 15401 between 2016 and 2021. The total recorded operations done during the study period (i.e., 2016-21) is 171249.

Sl. No.	Name of the Hospital	Table 3.12: Child Delivery										
		Male					*Female*					*Total*
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	*2016-17*	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Civil Hospital, Aizawl	2210	2132	2031	2172	2083	2067	2109	1986	2079	1876	20745
2	Kulikawn Hospital	48	23	34	36	35	48	32	32	41	45	374
3	Civil Hospital, Lunglei	435	419	417	318	384	391	431	362	322	350	3829
4	District Hospital, Champhai	351	365	412	487	550	353	338	383	447	536	4222
5	District Hospital, Serchhip	154	177	207	202	191	187	191	165	179	413	2066
6	District Hospital, Siaha	320	334	309	372	328	300	303	318	361	335	3280
7	District Hospital, Kolasib	329	311	377	318	363	326	331	365	366	379	3465
8	District Hospital, Mamit	115	131	116	145	115	125	131	103	138	125	1244
9	District Hospital, Lawngtlai	153	214	230	191	190	180	234	211	203	195	2001
10	Regional Cancer Centre	0	0	0	0	80	0	0	0	0	75	155
11	Referral Hospital, Falkawn	356	432	521	641	8	415	412	594	635	17	4031
	Total	4471	4538	4654	4882	4327	4392	4512	4519	4771	4346	45412

Source: Hospital Statistics 2016-21, Directorate of Hospital & Medical Education, Govt. of Mizoram

The above table (i.e., table 3.12) shows Child Delivery in various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest Child Delivery throughout the study period, i.e., 2016-21 with a Child Delivery (Male and Female) of 20745 during this period. Regional Cancer Centre has the lowest Child Delivery (Male and Female) with 151 deliveries 2020-21. Besides Regional Cancer Centre, only Kulikawn Hospital records deliveries less than 1000 with 374 deliveries during 2016-21. District Hospitals, Mamit, Lawngtlai and Serchhip have total deliveries (Male and Female) more than 1000 but less than 3000 with 1244, 2001 and 2066 respectively.

District Hospital, Champhai records the second highest total deliveries (Male and Female) with 4222 deliveries followed by Referral Hospital, Flakawn with 4031 total deliveries during 2016-21. District Hospitals, Lunglei, Kolasib and Siaha have total deliveries more than 3000 but less than 4000 with 3829, 3465 and 3280 respectively. The total male child delivery is highest in 2019-20 with 4882 deliveries and lowest in 2020-21 with total deliveries of 4327 between 2016 and 2021. The total female child delivery is highest in 2019-20 with 4771 deliveries and lowest in 2020-21 with a total delivery of 4346 between 2016 and 2021. The total recorded child delivery during the study period (i.e., 2016-21) is 45412.

Sl. No.	Name of the Hospital	Table 3.13: Still Birth										
		Male					*Female*					*Total*
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	*2016-17*	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Civil Hospital, Aizawl	24	22	35	16	21	20	28	21	17	23	227
2	Kulikawn Hospital	0	0	1	0	0	0	0	0	0	0	1
3	Civil Hospital, Lunglei	7	7	8	0	1	6	3	5	1	3	41
4	District Hospital, Champhai	6	3	2	2	0	1	9	3	1	0	27
5	District Hospital, Serchhip	2	3	0	0	0	0	0	0	0	0	5
6	District Hospital, Siaha	2	0	1	1	3	2	0	0	0	1	10
7	District Hospital, Kolasib	5	4	4	0	6	4	3	6	3	3	38
8	District Hospital, Mamit	6	0	0	2	3	5	2	1	1	1	21
9	District Hospital, Lawngtlai	4	0	0	4	1	0	0	0	3	0	12
10	Regional Cancer Centre	0	0	0	0	1	0	0	0	0	1	2
11	Referral Hospital, Falkawn	5	2	1	1	0	8	3	0	0	0	20
	Total	61	41	52	26	36	46	48	36	26	32	404

Source: Hospital Statistics 2016-21, Directorate of Hospital & Medical Education, Govt. of Mizoram

The above table (i.e., table 3.13) shows Still Birth in various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest Still Birth throughout the study period, i.e., 2016-21 with still births (Male and Female) of 227 during this period. Kulikawn Hospital has the lowest still birth (male only) with 1 still birth in 2018-19. Besides Kulikawn Hospital, Regional Cancer Centre and District Hospital, Serchhip record still birth less than 10 with 2 and 5 still births respectively during 2016-21. District Hospitals, Siaha, Lawngtlai, Referral Hospital, Falkawn, District Hospitals, Mamit and Champhai have still birth (Male and Female) less than 30 with 10, 12, 20, 21 and 27 respectively.

District Hospital, Lunglei records the second highest still birth (Male and Female) with 41 still births followed by District Hospital, Kolasib with 38 still births during 2016-21. The total male still birth is highest in 2016-17 with 61 still births and lowest in 2019-20 with total still births of 26 between 2016 and 2021. The total female still birth is highest in 2017-18 with 48 still births and lowest in 2019-20 with a total still birth of 26 between 2016 and 2021. The total recorded still birth during the study period (i.e., 2016-21) is 404.

Sl. No.	Name of the Hospitals	Table 3.14: Discharge										
		Live					*Death*					*Total*
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	*2016-17*	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Civil Hospital, Aizawl	14048	13673	13006	13364	12278	752	696	643	636	593	69689
2	Kulikawn Hospital	1211	1143	1245	1222	777	6	5	1	0	0	5610
3	Civil Hospital, Lunglei	6095	6202	5334	4649	3731	155	133	165	150	146	26760
4	District Hospital, Champhai	2445	2577	2756	2676	4283	85	106	107	93	142	15270
5	District Hospital, Serchhip	1947	2377	2406	2209	1859	51	75	76	53	75	11128
6	District Hospital, Siaha	3337	3108	1907	1868	2298	80	64	55	50	57	12824
7	District Hospital, Kolasib	3660	3903	3965	3945	3204	96	85	143	115	125	19241
8	District Hospital, Mamit	1411	1584	1671	1858	1358	31	28	12	27	28	8008
9	District Hospital, Lawngtlai	1777	1580	1755	1866	1491	48	26	58	52	73	8726
10	Regional Cancer Centre	1228	1580	1190	1180	155	66	26	54	57	9	5545
11	Referral Hospital, Falkawn	4874	5165	7313	6793	1451	113	108	202	303	23	26345
	Total	42033	42892	42548	41630	32885	1483	1352	1516	1536	1271	209146

Source: Hospital Statistics 2016-21, Directorate of Hospital & Medical Education, Govt. of Mizoram

The above table (i.e., table 3.14) shows the number of discharged patients in various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest discharge throughout the study period, i.e., 2016-21 with discharge (Live and Death) of 69689 during this period. Regional Cancer Centre has the lowest discharge (Live and Death) followed by Kulikawn Hospital with 5545 and 5610 discharge respectively during 2016-21. District Hospitals, Mamit and Lawngtlai record a total discharge of less than 1000 (Live and Death) with 8008 and 8726 respectively during 2016-21.

District Hospital, Lunglei records the second highest discharge (Live and Death) with 5610 discharges followed by Referral Hospital, Falkawn with 26345 discharges during 2016-21. District Hospitals, Kolasib, Champhai, Siaha and Serchhip record total discharge (Live and Death) of more than 10000 but less than 20000 with 19241, 15270, 12824 and 11128 respectively during 2016-21. The total live discharge is highest in 2017-18 with 42892 discharges and lowest in 2020-21 with a total discharge of 32885 between 2016 and 2021. The total death discharge is highest in 2019-20 with 1536 discharges and lowest in 2020-21 with a total discharge of 1271 between 2016 and 2021. The total recorded discharge during the study period (i.e., 2016-21) is 209146.

Table 3.15: Departmental-wise Distribution of OPD 2016-21 Financial Year												
Sl. No.	**Department**	**New Case**					**Old Case**					**Total**
		2016-17	***2017-18***	***2018-19***	***2019-20***	***2020-21***	***2016-17***	***2017-18***	***2018-19***	***2019-20***	***2020-21***	
1	Medicine	112310	120597	134540	124602	93244	29903	26574	28708	48313	36344	755135
2	Pediatric	52098	56717	65667	70896	32213	16102	16321	18507	23164	11990	363675
3	Emergency	84618	86911	91175	96299	70014	1205	5334	4570	4462	3828	448416
4	Gynae & Obst	32555	37257	39309	39043	28074	14476	15454	17516	24117	17725	265526
5	Orthopedic	26583	27442	31139	33203	19593	7353	7759	8323	11743	11511	184649
6	Surgery	26066	26503	25774	32711	21722	8343	6748	6908	14432	12466	181673
7	Ophthalmology	36152	39625	50178	46116	23142	7716	8834	10523	11991	6759	241036
8	ENT	28826	30765	34557	35659	19445	8262	7760	7763	9955	6144	189136
9	Dermatology	25931	29783	32142	32498	15292	7579	5252	4089	4520	2146	159232
10	Dental	33423	34933	39435	38100	22322	11060	10733	11098	14316	10755	226175
11	Dressing	19566	17540	21347	15303	11749	26525	24704	46542	31450	13689	228415
12	Ayush	26266	25390	19861	17437	15633	11871	13825	9745	7405	4707	152140
13	Psychiatric	4416	5089	5425	6639	6426	1701	2132	2531	3389	2739	40487
14	Oncology	1471	2010	2361	1776	1526	7693	11796	11091	10484	18833	69041
15	Cardiology	6002	6853	7245	7500	4455	4776	7474	7731	7674	5689	65399
16	DTC	584	728	4102	3724	2352	683	711	4256	5289	3897	26326
17	ART	1670	2706	9873	7733	7230	25429	48763	60808	66387	66830	297429
18	NCD Clinic	18753	27463	35180	46323	30400	6502	8970	10891	14413	10227	209122
19	Physiotherapy	7009	4123	6212	6719	2910	4050	1053	3154	3664	1645	40539
		544299	582435	655522	662281	427742	201229	230197	274754	317168	247924	4143551

Source: Hospital Statistics 2016-21, Directorate of Hospital & Medical Education, Govt. of Mizoram

The above table (i.e., table 3.15) shows departmental-wise distribution of patients in various Public Hospitals in Mizoram during 2016-21. Medicine department has the highest patients throughout the study period, i.e., 2016-21 with patients (New Case and Old Case) of 755135 during this period. Departments with patients less than 100000 (New Case and Old Case) are DTC followed by Physiotherapy, Psychiatric, Cardiology, and Oncology with 26326, 40539, 40487, 65399 and 69041 patients respectively during 2016-21. Departments with patients less than 200000 (New Case and Old Case) are ENT followed by Orthopedic, Surgery, Dermatology and Dressing with 189136,184649, 181673, 159232, 152140 patients respectively.

Emergency department records the second highest patients (New Case and Old Case) with 448416 patients followed by Pediatric, ART, Gyne & Obst., Ophthalmology, Dressing, Dental and NCD with 363675, 297429, 265526, 241036, 228415, 226175 and 209122 respectively during 2016-21. The total New Case is highest in 2019-20 with 662281 patients and lowest in 2020-21 with a total patient of 427742 between 2016 and 2021.

Departments such as ART, Dressing and Oncology have more Old Case than New Case due to the nature of the treatment with old cases being higher than new cases throughout the study period, i.e., difference between old case and new case being 239005, 57405 and 50735 respectively. Other departments have new cases proportionally higher than old cases. The total Old Case is highest in 2019-20 with 317168 patients and lowest in 2016-17 with a total patient of 201229 between 2016 and 2021. The total recorded patients across various departments during the study period (i.e., 2016-21) is 4143551.

3.4.2: In Patient Department

In this sub-section, the institutional provision as well as the trends and pattern of in-patient department across various Public Hospitals is analyzed. Various pertinent statistics that elucidate the day-to-day functioning of the in-patient department is illustrated. For the analysis of performance and healthcare provision, concepts such as total days of patients discharged, average length of stay, total in-patient census,

average bed occupancy, bed turnover ratio and daily census of indoor patient are employed.

The meaning of these employed concepts is discussed further–

(i) A bed-day or part of a day that a patient is admitted to receive a hospital treatment is known as bed day or days of patients discharged. A bed-day is a day during which a person is confined to a bed and in which the patient usually stays overnight in a hospital. It is the unit of measure denoting services rendered to the one in-patient day in the hospital. One full day is counted when admission is done before mid-day and discharge after mid-day. Patient-day does not include data for healthy new born infants.

(ii) Average length of stay refers to the average number of days that a patient status in a hospital. It is a term used to calculate a patient's day of admission in the hospital until the day of discharge, i.e., the number of days a patient stays in a hospital for treatment.

(iii) The total in-patient census describes on a given time-frame basis the number of patients who were occupying a bed as of midnight.

(iv) The average bed occupancy rate is a measure of the utilization of the available bed capacity. It indicates the percentage of beds occupied by a patient in a defined period of time, usually a year.

(v) The bed turnover ratio is a measure of productivity hospital beds and represents the number of patients treated per bed in a defined period of time (usually a year). Turnover ratio in acute care hospitals is expected to be higher than that of chronic hospitals. It is also expected to be higher in lower-level hospitals as compared to higher-level ones.

(vi) The daily census of indoor patient or Average Daily Census (ADC) is a census report which describes on a daily basis the number of patients who were occupying a bed as of midnight. It describes the number of patient days in a given time period divided by the number of days in a given time period.

The following tables describes the trends, pattern as well as performance and institutional provision of In-Patient Department (IPD) across various Public Hospitals in Mizoram:

Sl. No.	Name of Hospital	Table 3.16: Total Days of Patients Discharged					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	81184	78701	75999	85833	77833	399550
2	Kulikawn Hospital	9373	8307	10023	9330	5956	42989
3	Civil Hospital, Lunglei	31571	31019	27783	26221	20027	136621
4	District Hospital, Champhai	7839	10514	10423	10887	12591	52254
5	District Hospital, Serchhip	9658	12730	16521	13904	11125	63938
6	District Hospital, Siaha	13519	13041	11658	13660	23296	75174
7	District Hospital, Kolasib	15964	16399	16518	25840	15723	90444
8	District Hospital, Mamit	5158	17585	7791	8179	5292	44005
9	District Hospital, Lawngtlai	8491	6961	7748	7982	6653	37835
10	Regional Cancer Centre	8584	6558	6528	6057	5492	33219
11	Referral Hospital, Falkawn	39805	35581	56003	56346	11111	198846
	Total	231146	237396	246995	264239	195099	1174875

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.16) shows the total days of patients discharged in various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest cumulative days of patients discharged throughout the study period, i.e., 2016-21 with cumulative total days of 399550. Regional Cancer Centre has the lowest cumulative days of patients discharged followed by District Hospital, Lawngtlai with 33219 and 37835 cumulative total days of patients discharged respectively during 2016-21. Kulikawn Hospital and District Hospital, Mamit record cumulative days of patients discharged of less than 50000 with 42989 and 44005 respectively during 2016-21.

Referral Hospital, Falkawn records the second highest cumulative days of patients discharged with 198846 followed by Civil Hospital, Lunglei with 136621 cumulative days of patients discharged during 2016-21. District Hospitals, Kolasib,

Siaha, Serchhip and Champhai record total cumulative days of patients discharged of more than 50000 but less than 100000 with 90444, 75174, 63938 and 52254 respectively during 2016-21. The total days of patients discharged is highest in 2019-20 with 264239 total days and lowest in 2020-21 with total days of patients discharged of 195099 between 2016 and 2021. The total recorded cumulative days of patients discharged during the study period (i.e., 2016-21) is 1174875.

Sl. No.	Name of Hospital	Table 3.17: Average Length of Stay					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	7.3	6.99	7.43	7.14	8.71	7.51
2	Kulikawn Hospital	7.76	7.28	7.74	8.31	8.49	7.91
3	Civil Hospital, Lunglei	5.04	4.9	5.1	5.73	5.87	5.32
4	District Hospital, Champhai	3.08	3.08	3.25	4.75	4.67	3.76
5	District Hospital, Serchhip	4.49	4.53	7.08	6.74	6.00	5.76
6	District Hospital, Siaha	4.08	4.27	6.03	7.49	9.77	6.32
7	District Hospital, Kolasib	4.73	4.09	4.04	4.11	4.62	4.31
8	District Hospital, Mamit	3.00	3.61	3.07	4.3	4.34	3.66
9	District Hospital, Lawngtlai	4.86	4.37	4.43	4.27	4.29	4.44
10	Regional Cancer Centre	6.55	6.55	5.36	4.93	5.59	5.79
11	Referral Hospital, Falkawn	8.29	6.91	7.54	7.94	9.27	7.99
		5.38	5.14	5.55	5.97	6.51	5.70

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.17) shows the average length of stay in various Public Hospitals in Mizoram during 2016-21. Referral Hospital, Falkawn has the highest average length of stay throughout the study period, i.e., 2016-21 with 7.99. District Hospital, Mamit has the lowest average length of stay followed by District Hospital, Champhai with 3.66 and 3.76 respectively during 2016-21. Kulikawn Hospital, Civil Hospital, Aizawl and District hospital, Siaha record an average length of stay higher than 6 days with 7.91 and 7.51 and 6.32 respectively during 2016-21.

Regional Cancer Centre, District Hospital, Serchhip and Civil Hospital, Lunglei, record an average length of stay higher than 5 days but less than 6 days with 5.79, 5.76 and 5.32 respectively during 2016-21. District Hospitals, Lawngtlai and Kolasib record an average length of stay higher than 4 days but less than 5 days with

4.44 and 4.31 respectively during 2016-21. The total average length of stay is highest in 2020-21 with 6.51 total days and lowest in 2017-18 with an average length of stay of 5.14 between 2016 and 2021. The total average length of stay during the study period (i.e., 2016-21) is 5.70.

It can be seen from this table that the average length of stay is usually higher in those Public Hospitals where treatment and care are usually more sophisticated than others such as Regional Cancer Centre, Referral Hospital, Falkawn and Kulikawn Hospital, where patients who need special care with proper medical facilities are admitted. The recuperation period is usually higher than other medical complications which can be treated more or less effectively without the need of specialized care and attention. Also, Civil Hospital, Aizawl has more than average length of stay due to the sheer number of higher endowments such as bed strength and manpower.

Table 3.18: Total in-patient Census

Sl. No.	Name of Hospital	2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	80577	79709	81963	80305	79481	402035
2	Kulikawn Hospital	9651	8281	9223	7822	4206	39183
3	Civil Hospital, Lunglei	22434	33715	28672	33250	23565	141636
4	District Hospital, Champhai	7921	10322	12398	13309	16418	60368
5	District Hospital, Serchhip	7759	3132	2559	2433	2258	18141
6	District Hospital, Siaha	3420	3166	1962	1916	2354	12818
7	District Hospital, Kolasib	6166	5908	15102	16349	13356	56881
8	District Hospital, Mamit	5093	1678	2002	6023	5253	20049
9	District Hospital, Lawngtlai	8662	8083	4954	366	0	22065
10	Regional Cancer Centre	1294	1027	1234	1237	1002	5794
11	Referral Hospital, Falkawn	36752	37797	60910	69032	13252	217743
		189729	192818	220979	232042	161145	996713

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.18) shows the total in-patient census in various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest total in-patient census throughout the study period, i.e., 2016-21 with a cumulative

total of 402035. Regional Cancer Centre has the lowest in-patient census followed by District Hospital, Siaha with cumulative total in-patient census of 5749 and 12818 respectively during 2016-21. District Hospitals, Serchhip, Mamit and Lawngtlai record total in-patient census higher than 20000 but less than 30000 with 18141, 20049 and 22065 respectively during 2016-21.

Referral Hospital, Falkawn records the second highest total in-patient census of 217743 followed by Civil Hospital, Lunglei with 141636 during 2016-21. District Hospitals, Champhai and Kolasib record total in-patient census of more than 55000 but less than 65000 with 60368 and 56881 respectively during 2016-21. Meanwhile, Kulikawn Hospital records a total in-patient census of 39183 during the study period, i.e., 2016-21. The total in-patient census is highest in 2019-20 with 232042 and lowest in 2020-21 with 161145 between 2016 and 2021. The total cumulative in-patient census during the study period (i.e., 2016-21) is 996713.

Sl. No.	Name of Hospital	Table 3.19: Average Bed Occupancy					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	81.58%	82.53%	83.45%	81.59%	75.24%	0.81
2	Kulikawn Hospital	53.67%	45.46%	51.14%	51.37%	32.51%	0.47
3	Civil Hospital, Lunglei	86.48%	85.05%	76.80%	71.26%	50.78%	0.74
4	District Hospital, Champhai	38.65%	43.74%	40.45%	45.60%	46.19%	0.43
5	District Hospital, Serchhip	38.66%	48.85%	76.46%	69.23%	51.51%	0.57
6	District Hospital, Siaha	82.12%	79.11%	70.98%	82.36%	82.30%	0.79
7	District Hospital, Kolasib	74.93%	76.04%	74.17%	73.67%	68.67%	0.73
8	District Hospital, Mamit	58.30%	48.85%	68.10%	80.50%	59.04%	0.62
9	District Hospital, Lawngtlai	79.62%	77.26%	86.78%	82.04%	63.07%	0.63
10	Regional Cancer Centre	88.82%	87.00%	92.00%	88.00%	75.90%	0.86
11	Referral Hospital, Falkawn	60.95%	59.07%	63.70%	65.71%	18.37%	0.54
		0.67	0.66	0.71	0.71	0.56	0.88

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.19) shows the average bed occupancy in various Public Hospitals in Mizoram during 2016-21. Regional Cancer Centre has the highest average bed occupancy throughout the study period, i.e., 2016-21 with a bed occupancy rate of 0.86. District Hospital, Champhai has the lowest average bed

occupancy followed by Kulikawn Hospital with an average bed occupancy rate of 0.43 and 0.47 respectively during 2016-21. Civil Hospital, Aizawl has the second highest average bed occupancy rate of 0.81 during 2016-21.

Referral Hospital, Falkawn, District Hospitals, Serchhip, Mamit and Lawngtlai record an average bed occupancy rate of higher than 50 but less than 70 percent with 0.54, 0.57, 0.62 and 0.63 respectively during 2016-21. District Hospital, Kolasib, Civil Hospital, Lunglei and District Hospital, Siaha record an average bed occupancy rate of higher than 70 but less than 80 percent with 0.73, 0.74 and 0.79 respectively during 2016-21. The average bed occupancy is highest in 2018-19 and 2019-20 with 0.71 in both years and lowest in 2020-21 with 0.56 between 2016 and 2021. The total average bed occupancy rate during the study period (i.e., 2016-21) is 0.88.

Table 3.20: Bed Turnover Ratio

Sl. No.	Name of Hospital	2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	4.66	4.50	4.16	4.43	5.36	4.62
2	Kulikawn Hospital	1.98	1.88	2.07	2.03	1.40	1.87
3	Civil Hospital, Lunglei	4.33	3.50	3.05	2.51	4.58	3.59
4	District Hospital, Champhai	3.51	3.52	3.26	2.76	6.06	3.82
5	District Hospital, Serchhip	2.77	3.41	3.44	2.93	2.69	3.04
6	District Hospital, Siaha	6.32	5.75	3.63	3.53	2.64	4.37
7	District Hospital, Kolasib	5.00	5.54	5.70	5.63	4.62	5.29
8	District Hospital, Mamit	4.01	4.41	4.80	6.00	4.40	4.72
9	District Hospital, Lawngtlai	5.13	4.46	4.55	4.66	3.89	4.53
10	Regional Cancer Centre	2.03	1.71	2.07	2.08	2.45	2.06
11	Referral Hospital, Falkawn	2.47	2.69	2.57	2.26	0.63	2.12
	Total	3.83	3.76	3.57	3.52	3.52	3.63

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.20) shows the bed turnover ratio in various Public Hospitals in Mizoram during 2016-21. District Hospital, Kolasib has the highest bed turnover ratio throughout the study period, i.e., 2016-21 with a ratio of 5.29. Kulikawn Hospital has the lowest bed turnover ratio with 1.87 during 2016-21. District Hospital, Mamit has the second highest bed turnover ratio with a ratio of 4.72 followed by Civil

Hospital, Aizawl, District Hospitals, Lawngtlai and Siaha with a ratio of 4.62, 4.53 and 4.37 respectively during 2016-21.

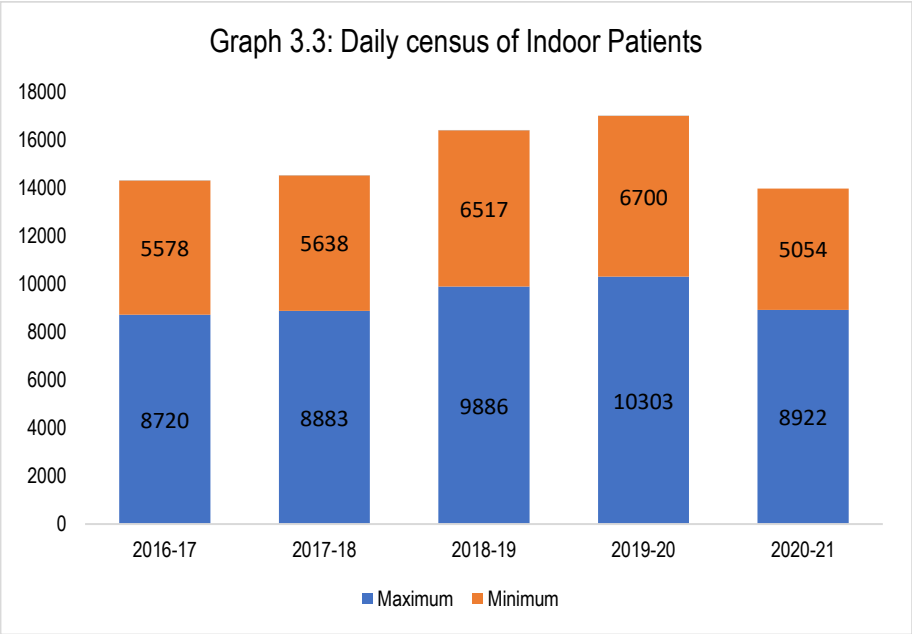
District Hospital, Champhai, Civil Hospital, Lunglei and District Hospital Serchhip have a bed turnover ratio of more than 3 but less than 4 with 3.82, 3.59 and 3.04 respectively during 2016-21. The bed turnover ratio is highest in 2016-17 with 3.83 and lowest in 2019-20 and 2020-21 with 3.52 for both years. The total bed turnover ratio during the study period (i.e., 2016-21) is 3.63.

Sl. No.	Name of the Hospitals	Table 3.21: Daily Census of Indoor Patients										
		Maximum					*Minimum*					*Total*
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	*2016-17*	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Civil Hospital, Aizawl	2887	2865	2945	2862	2883	2360	2339	2362	2337	2275	26115
2	Kulikawn Hospital	379	354	390	423	307	248	218	235	220	142	2916
3	Civil Hospital, Lunglei	1282	1386	1199	1265	1201	902	857	757	739	611	10199
4	District Hospital, Champhai	195	205	267	578	831	25	34	61	313	372	2881
5	District Hospital, Serchhip	341	516	777	803	760	111	177	228	219	188	4120
6	District Hospital, Siaha	526	540	510	516	809	396	378	280	344	547	4846
7	District Hospital, Kolasib	566	624	667	654	623	373	404	433	413	411	5168
8	District Hospital, Mamit	283	210	187	284	263	110	37	67	116	90	1647
9	District Hospital, Lawngtlai	340	329	365	60	250	132	173	253	41	106	2049
10	Regional Cancer Centre	397	286	276	265	278	235	166	160	153	122	2338
11	Referral Hospital, Falkawn	1524	1568	2303	2593	717	686	855	1681	1805	190	13922
	Total	8720	8883	9886	10303	8922	5578	5638	6517	6700	5054	76201

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.21) shows the daily census of indoor patients in various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest daily census of indoor patients throughout the study period, i.e., 2016-21 with 26115 cumulative total. District Hospital, Mamit has the lowest daily census of indoor patients with 1647 during 2016-21. Referral Hospital, Falkawn has the second highest daily census of indoor patients with a 13922 followed by Civil Hospital, Lunglei, with 10199 during 2016-21.

Kulikawn Hospital, District Hospital, Champhai, Regional Cancer Centre and District Hospital, Lawngtlai have daily census of indoor patients of between 2000 and 3000 with 2916, 2881, 2388 and 2049 respectively during 2016-21. District Hospitals, Kolasib, Siaha and Serchhip have daily census of indoor patients between 4000 and 5500 with 5168, 4864 and 4120 respectively during 2016-21. The maximum daily census of indoor patients is highest in 2019-20 with 10303 and lowest in 2016-17 with 8720 between 2016 and 2021. The minimum daily census of indoor patients is highest in 2019-20 with 6700 and lowest in 2020-21 with 5054 between 2016 and 2021.The cumulative total daily indoor patients during the study period (i.e., 2016-21) is 76201.



The above figure (i.e., Graph 3.3) highlights the daily census of maximum and minimum days of indoor patients during the year 2016-21. The maximum and minimum are highest in the year 2019-20 and lowest in 2020-21.

Table 3.22: Number of Autopsy

Sl. No.	Name of Hospital	2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	84	71	73	96	78	402
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	12	19	20	18	18	87
4	District Hospital, Champhai	0	2	2	9	11	24
5	District Hospital, Serchhip	2	0	0	0	0	2
6	District Hospital, Siaha	9	0	0	0	0	9
7	District Hospital, Kolasib	0	0	11	19	10	40
8	District Hospital, Mamit	0	0	0	7	2	9
9	District Hospital, Lawngtlai	5	19	3	8	8	43
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	0	0	0	0	0	0
		112	111	109	157	127	616

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.22) shows the number of autopsies done in various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest number of autopsies done throughout the study period, i.e., 2016-21 with 402 cumulative total. Kulikawn Hospital, Regional Cancer Centre and Referral Hospital, Falkawn have no autopsy done during 2016-21. District Hospitals, Serchhip, Siaha and Mamit have less than 10 autopsies done during the study period, i.e., 2016-21 with a cumulative total of only 2, 9 and 9 autopsies done respectively.

Also, District Hospitals, Champhai, Kolasib and Lawngtlai have less than 50 autopsies done during 2016-21 with 24, 40 and 43 respectively. The second highest number of autopsies done by Public Hospital establishment is Civil Hospital, Lunglei with a total cumulative of 87 autopsies during the study period, i.e., 2016-21. The

highest number of autopsies done is in 2019-20 where a total of 157 and the lowest is in 2017-18 with 111 between 2016 and 2021. The cumulative total number of autopsies done across the various Public Hospital establishments during the study period, i.e., 2016-21 is 616.

Sl. No.	Name of Hospital	Table 3.23: Cases Referred Outside Mizoram					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	2110	2729	2511	2725	1133	11208
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	170	197	252	239	50	908
4	District Hospital, Champhai	0	0	0	0	0	0
5	District Hospital, Serchhip	0	0	0	0	0	0
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	0	0	0	22	0	22
11	Referral Hospital, Falkawn	0	0	0	0	0	0
		2280	2926	2763	2986	1183	12138

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.23) shows the number of cases referred outside Mizoram among various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest number of cases referred outside Mizoram throughout the study period, i.e., 2016-21 with 11208 cumulative total. Kulikawn Hospital, Referral Hospital, Falkawn, District Hospitals, Champhai, Serchhip, Siaha, Kolasib, Mamit and Lawngtlai have no cases referred outside Mizoram during 2016-21.

The second highest number of cases referred outside Mizoram by Public Hospital establishment is Civil Hospital, Lunglei with a cumulative total of 908 cases referred followed by Regional Cancer Centre with a cumulative total of 22 during the study period, i.e., 2016-21. Cases referred outside Mizoram is highest in 2017-18 with a total of 2926 and lowest in 2020-21 with a total of 1183 between 2016 and 2021.

The cumulative total number of cases referred outside Mizoram across the various Public Hospital establishments during the study period, i.e., 2016-21 is 12138.

Sl. No.	Name of Hospital	Table 3.24: Mizoram State Healthcare Scheme					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	3267	3348	1428	1333	3312	12688
2	Kulikawn Hospital	13	9	17	28	56	123
3	Civil Hospital, Lunglei	176	124	197	227	363	1087
4	District Hospital, Champhai	17	21	12	0	351	401
5	District Hospital, Serchhip	79	64	24	13	296	476
6	District Hospital, Siaha	0	0	0	0	37	37
7	District Hospital, Kolasib	0	62	137	30	77	306
8	District Hospital, Mamit	6	15	6	16	119	162
9	District Hospital, Lawngtlai	170	18	11	0	17	216
10	Regional Cancer Centre	1201	1067	906	0	2	3176
11	Referral Hospital, Falkawn	215	249	494	375	76	1409
		5144	4977	3232	2022	4706	20081

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.24) shows the number of beneficiaries of Mizoram State Healthcare Scheme among various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest number of Mizoram State Healthcare Scheme beneficiaries throughout the study period, i.e., 2016-21 with 12688 cumulative total. Regional Cancer has the second highest Mizoram State Healthcare Scheme beneficiaries with a cumulative total of 3176 during 2016-21.

Civil Hospital, Lunglei and Referral Hospital, Falkawn have Mizoram State Healthcare Scheme beneficiaries higher than 1000 with 1087 and 1409 beneficiaries respectively during the study period, i.e., 2016-21. District Hospital, Siaha has the lowest Mizoram State Healthcare Scheme beneficiaries with only 37 followed by Kulikawn Hospital, District Hospitals, Mamit and Lawngtlai with 123, 162 and 216 beneficiaries respectively during 2016-21. District Hospitals, Kolasib, Champhai and

Serchhip have Mizoram State Healthcare Scheme beneficiaries of 306, 401 and 476 respectively during 2016-21. Mizoram State Healthcare Scheme beneficiaries is highest in 2016-17 with 5144 and lowest in 2019-20 with 2022 during 2016-21. The cumulative total of Mizoram State Healthcare Scheme beneficiaries is 20081 between 2016 and 2021.

Sl. No.	Name of Hospital	Table 3.25: Ayushman Bharat (PMJAY)					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	3231	2334	2399	5510	4018	17492
2	Kulikawn Hospital	169	161	148	191	59	728
3	Civil Hospital, Lunglei	1077	1121	1360	1450	1104	6112
4	District Hospital, Champhai	1159	786	442	1358	909	4654
5	District Hospital, Serchhip	668	859	734	1237	779	4277
6	District Hospital, Siaha	500	466	216	442	367	1991
7	District Hospital, Kolasib	0	1323	464	812	890	3489
8	District Hospital, Mamit	605	611	412	644	308	2580
9	District Hospital, Lawngtlai	152	312	366	189	202	1221
10	Regional Cancer Centre	1665	1365	1726	2819	2259	9834
11	Referral Hospital, Falkawn	1742	2173	3601	3747	104	11367
		10968	11511	11868	18399	10999	63745

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.25) shows the number of beneficiaries of PMJAY among various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest number of PMJAY beneficiaries throughout the study period, i.e., 2016-21 with 17492 cumulative total. Referral Hospital, Falkawn has the second highest PMJAY beneficiaries with a cumulative total of 11367 followed by Regional Cancer Centre and Civil Hospital, Lunglei with 9834 and 6112 beneficiaries respectively during 2016-21.

Kulikawn Hospital has the lowest number of PMJAY beneficiaries with a cumulative total of only 728 during the study period, i.e., 2016-21. District Hospitals, Lawngtlai and Siaha have PMJAY beneficiaries less than 2000 with 1221 and 1991 beneficiaries respectively during 2016-21. Other District Hospitals–Mamit, Kolasib, Serchhip and Champhai have PMJAY beneficiaries of more than 2000 but less than

5000 with a cumulative total of 2580, 3489, 4277 and 4654 beneficiaries respectively during 2016-21. PMJAY beneficiaries is highest in 2019-20 with 18399 and lowest in 2016-17 with 10968 during 2016-21. The cumulative total of PMJAY beneficiaries is 63745 between 2016 and 2021.

3.4.3: Other Healthcare Services

In this section, other healthcare provisions other than Out-patient and In-patient care is discussed by stressing on the absolute number and trends in investigation and follow-up being done during the study period, i.e., 2016-21 across various Public Hospital establishments in Mizoram. The following tables and figures highlight the trend and pattern other healthcare services of Public Hospitals in Mizoram–

Sl. No.	Name of Hospital	Table 3.26: Laboratory Investigations					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	825407	653109	823632	935593	803650	4041391
2	Kulikawn Hospital	8325	7095	10133	8527	6943	41023
3	Civil Hospital, Lunglei	55136	68346	74833	108817	110064	417196
4	District Hospital, Champhai	9503	11159	10973	25909	41599	99143
5	District Hospital, Serchhip	13382	27748	36215	34828	38381	150554
6	District Hospital, Siaha	7799	6013	6396	7562	8017	35787
7	District Hospital, Kolasib	25942	28592	29016	34744	30459	148753
8	District Hospital, Mamit	3461	3216	4884	8761	9294	29616
9	District Hospital, Lawngtlai	3980	8651	11051	10298	6205	40185
10	Regional Cancer Centre	10447	11091	12972	13784	9858	58152
11	Referral Hospital, Falkawn	10385	42591	209031	237942	72040	571989
	Total	973767	867611	1229136	1426765	1136510	5633789

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.26) shows the number of laboratory investigations done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest laboratory investigations done throughout the study period, i.e., 2016-21 with 4041391 investigations done during this period. District Hospital, Mamit has the lowest laboratory investigations done with 29616 between 2016 and 2021.

Besides District Hospital, Mamit, District Hospitals, Lawngtlai and Siaha and Kulikawn Hospital have laboratory investigations done less than 50000 with 35787, 40185 and 41023 respectively during 2016-21.

Referral Hospital, Falkawn records the second highest laboratory investigations done with 571989 followed by Civil Hospital, Lunglei and District Hospitals, Serchhip and Kolasib with 417196, 150554 and 148753 laboratory investigations done during 2016-21. District Hospital, Champhai and Regional Cancer Centre have more than 50000 but less than 100000 laboratory investigations done with 99143 and 58152 respectively during the study period, i.e., 2016-21. The total laboratory investigations done is highest in 2019-20 with 1426765 and lowest in 2017-18 with 867611 between 2016 and 2021. The cumulative total recorded laboratory investigations done during the study period (i.e., 2016-21) is 5633789.

Sl. No.	Name of Hospital	Table 3.27: X-Ray					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	25556	19011	25444	27629	19675	117315
2	Kulikawn Hospital	1375	1339	1813	1491	1113	7131
3	Civil Hospital, Lunglei	2358	5440	4296	4984	4426	21504
4	District Hospital, Champhai	1984	2771	3584	4360	3465	16164
5	District Hospital, Serchhip	1735	3851	3637	2786	3319	15328
6	District Hospital, Siaha	657	821	857	723	1129	4187
7	District Hospital, Kolasib	4854	4388	4660	3726	2108	19736
8	District Hospital, Mamit	1146	960	2026	1723	1515	7370
9	District Hospital, Lawngtlai	849	1068	1649	1965	1347	6878
10	Regional Cancer Centre	214	198	151	158	197	918
11	Referral Hospital, Falkawn	4553	5905	8276	13066	368	32168
	Total	45281	45752	56393	62611	38662	248699

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.27) shows the number of X-Ray investigation done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest X-Ray investigations done throughout the study period, i.e., 2016-21 with 117315 X-Rays done during this period. Regional Cancer Centre has the lowest X-ray investigations done with 918 between 2016 and 2021. Besides Regional

Cancer Centre, District Hospitals, Siaha, Lawngtlai, Kulikawn Hospital and District Hospital, Mamit have X-Ray investigations done less than 10000 with 4187, 6878, 7131 and 7370 respectively during 2016-21.

Referral Hospital, Falkawn records the second highest X-Ray investigations done with 32168 followed by Civil Hospital, Lunglei and District Hospitals, Kolasib, Champhai and Serchhip with 21504, 19736, 16164 and 15328 X-Ray investigations done during 2016-21. The total X-Ray investigations done is highest in 2019-20 with 62611 and lowest in 2020-21 with 38662 between 2016 and 2021. The cumulative total recorded X-Ray investigations done during the study period (i.e., 2016-21) is 248699.

Sl. No.	Name of Hospital	Table 3.28: Endoscopy					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	4068	4046	4405	4884	3170	20573
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	79	241	362	555	309	1546
4	District Hospital, Champhai	65	283	361	372	7	1088
5	District Hospital, Serchhip	133	439	77	357	7	1013
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	26	422	0	448
8	District Hospital, Mamit	0	0	46	178	179	403
9	District Hospital, Lawngtlai	317	273	988	794	598	2970
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	880	2013	2179	2391	88	7551
	Total	5542	7295	8444	9953	4358	35592

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.28) shows the number of endoscopy investigation done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest endoscopy investigations done throughout the study period, i.e., 2016-21 with 20573 endoscopies done during this period. Kulikawn Hospital, District Hospital, Siaha and Regional Cancer Centre have recorded nil or zero endoscopy investigation during the study period, i.e., 2016-21 due to unavailability of machine or medical equipment required to perform the said investigation. District

Hospital, Mamit has the lowest endoscopy investigations done with 403 followed by District Hospital, Kolasib with 448 between 2016 and 2021. Civil Hospital, Lunglei, District Hospitals, Champhai and Serchhip have endoscopy investigations done below 2000 with 1546, 1088 and 1013 respectively during 2016-21.

Referral Hospital, Falkawn records the second highest endoscopy investigations done with 7551 followed by District Hospital, Lawngtlai with 2970 endoscopy investigations done during 2016-21. The total endoscopy investigation done is highest in 2019-20 with 9953 and lowest in 2020-21 with 4358 between 2016 and 2021. The cumulative total recorded endoscopy investigations done during the study period (i.e., 2016-21) is 35592.

Sl. No.	Name of Hospital	Table 3.29: ECG					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	8127	6550	8357	9693	7894	40621
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	710	1161	492	1016	1290	4669
4	District Hospital, Champhai	219	296	385	583	671	2154
5	District Hospital, Serchhip	216	374	308	552	671	2121
6	District Hospital, Siaha	0	0	0	0	104	104
7	District Hospital, Kolasib	71	0	256	352	405	1084
8	District Hospital, Mamit	38	114	162	321	327	962
9	District Hospital, Lawngtlai	0	26	492	374	110	1002
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	220	746	2463	2557	70	6056
	Total	9601	9267	12915	15448	11542	58773

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.29) shows the number of ECG investigation done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest ECG investigation done throughout the study period, i.e., 2016-21 with 40621 ECG done during this period. Kulikawn Hospital and Regional Cancer Centre have recorded nil or zero ECG investigation during the study period, i.e., 2016-21 due to unavailability of the machine required to perform the said investigation. District Hospital, Siaha has the lowest ECG investigation done with 104 followed by District

Hospital, Mamit with 962 between 2016 and 2021. District Hospitals, Champhai, Serchhip, Kolasib and Lawngtlai have ECG investigation done below 3000 with 2454, 2121, 1084 and 1022 respectively during 2016-21.

Referral Hospital, Falkawn records the second highest ECG investigation done with 6056 ECG investigations done during 2016-21. The total ECG investigation done is highest in 2019-20 with 15448 and lowest in 2017-18 with 9267 between 2016 and 2021. The cumulative total recorded ECG investigation done during the study period (i.e., 2016-21) is 58773.

Sl. No.	Name of Hospital	Table 3.30: Ultrasound					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	6399	4554	4546	6076	5282	26857
2	Kulikawn Hospital	126	316	562	77	0	1081
3	Civil Hospital, Lunglei	1343	1675	1550	2009	2173	8750
4	District Hospital, Champhai	0	427	552	768	782	2529
5	District Hospital, Serchhip	0	36	644	606	782	2068
6	District Hospital, Siaha	671	1563	1142	1635	1278	6289
7	District Hospital, Kolasib	1283	1504	1700	1321	1212	7020
8	District Hospital, Mamit	44	274	240	366	861	1785
9	District Hospital, Lawngtlai	0	992	1337	1111	900	4340
10	Regional Cancer Centre	0	0	0	0	319	319
11	Referral Hospital, Falkawn	2235	3585	6373	7174	122	19489
	Total	12101	14926	18646	21143	13711	80527

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.30) shows the number of ultrasound investigation done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest ultrasound investigation done throughout the study period, i.e., 2016-21 with 26857 ultrasounds done during this period. Regional Cancer Centre, Kulikawn Hospital and District Hospital, Mamit have recorded the lowest ultrasound investigation done during the study period, i.e., 2016-21 with 319,1081 and 1785 respectively. District Hospitals, Lawngtlai, Champahi and Serchhip have recorded less than 5000 ultrasound investigation done with 4340, 2529 and 2068 respectively between 2016 and 2021. District Hospitals, Kolasib and Siaha have ultrasound

investigation done more than 5000 but less than 10000 with 7020 and 6289 respectively during 2016-21.

Referral Hospital, Falkawn records the second highest ultrasound investigation done with 19489 followed by Civil Hospital, Lunglei with 8750 during 2016-21. The total ultrasound investigation done is highest in 2019-20 with 21143 and lowest in 2016-17 with 12101 between 2016 and 2021. The cumulative total recorded ultrasound investigation done during the study period (i.e., 2016-21) is 80527.

Sl. No.	Name of Hospital	Table 3.31: Physiotherapy					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	17004	15011	30133	23575	17736	103459
2	Kulikawn Hospital	0	0	0	0	4	4
3	Civil Hospital, Lunglei	229	313	388	568	453	1951
4	District Hospital, Champhai	0	0	0	193	241	434
5	District Hospital, Serchhip	0	0	0	0	241	241
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	45	147	70	262
8	District Hospital, Mamit	0	0	26	96	77	199
9	District Hospital, Lawngtlai	0	0	23	93	109	225
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	0	719	1790	1488	27	4024
	Total	17233	16043	32405	26160	18958	110799

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.31) shows the number of physiotherapy sessions done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest physiotherapy sessions done throughout the study period, i.e., 2016-21 with 103459 sessions done during this period. District Hospital, Siaha and Regional Cancer Centre have recorded nil or zero physiotherapy sessions during the study period, i.e., 2016-21 due to unavailability of machine and medical personnel required to perform the said investigation. District Hospitals, Champhai, Kolasib, Serchhip, Lawngtlai and Mamit have recorded less than 500 physiotherapy sessions with 434, 262, 241 and 225 respectively between 2016 and 2021.

Referral Hospital, Falkawn records the second highest physiotherapy sessions done with 4024 sessions done during 2016-21. The total physiotherapy sessions done is highest in 2018-19 with 32405 and lowest in 2016-17 with 17233 between 2016 and 2021. The cumulative total recorded physiotherapy sessions done during the study period (i.e., 2016-21) is 110799.

Sl. No.	Name of Hospital	Table 3.32: Chemotherapy					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	0	0	0	0	0	0
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	174	136	165	140	112	727
4	District Hospital, Champhai	0	0	0	0	0	0
5	District Hospital, Serchhip	0	0	0	0	0	0
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	6480	6257	6646	6783	6571	32737
11	Referral Hospital, Falkawn	0	0	0	0	0	0
	Total	6654	6393	6811	6923	6683	33464

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.32) shows the number of chemotherapy doze done across various Public Hospitals in Mizoram during 2016-21. Regional Cancer Centre has the highest physiotherapy sessions done throughout the study period, i.e., 2016-21 with 32737 chemotherapy dozes done followed by Civil Hospital, Lunglei with 727 chemotherapy dozes done during this period.

All other Public Healthcare establishments have recorded a nil or zero chemotherapy doze during the study period, i.e., 2016-21 due to unavailability of machine, equipment and medical personnel required to perform the said investigation. The total chemotherapy doze done is highest in 2019-20 with 6923 and lowest in 2017-

18 with 6393 between 2016 and 2021. The cumulative total recorded chemotherapy doze done during the study period (i.e., 2016-21) is 33464.

Sl. No.	Name of Hospital	Table 3.33: Dietician					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	1051	834	725	1151	294	4055
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	0	0	0	0	0	0
4	District Hospital, Champhai	0	0	0	0	0	0
5	District Hospital, Serchhip	0	0	0	0	0	0
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	0	0	0	0	0	0
	Total	1051	834	725	1151	294	4055

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.33) shows the number of dietician consultation done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest dietician consultation done throughout the study period, i.e., 2016-21 with 4055 consultations done during this period. All other Public Healthcare establishments have recorded a nil or zero dietician consultation during the study period, i.e., 2016-21 due to unavailability of machine, equipment and medical personnel required to perform the said investigation.

The total dietician consultation done is highest in 2019-20 with 1151 and lowest in 2020-21 with 294 between 2016 and 2021. The cumulative total recorded dietician consultation done during the study period (i.e., 2016-21) is 4055.

Sl. No.	Name of Hospital	Table 3.34: Colonoscopy					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	0	0	0	102	310	412
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	0	0	0	0	0	0
4	District Hospital, Champhai	0	0	0	0	0	0
5	District Hospital, Serchhip	0	0	0	0	0	0
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	0	0	71	152	0	223
	Total	0	0	71	254	310	635

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.34) shows the number of colonoscopies done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest colonoscopies done throughout the study period, i.e., 2016-21 with 4055 colonoscopies done followed by Referral Hospital, Falkawn with 233 colonoscopies done during this period. All other Public Healthcare establishments have recorded a nil or zero colonoscopy done during the study period, i.e., 2016-21 due to unavailability of machine, equipment and medical personnel required to perform the said investigation.

The total colonoscopies done is highest in 2020-21 with 310 and lowest in 2018-19 with 71 between 2016 and 2021. The cumulative total recorded colonoscopies done during the study period (i.e., 2016-21) is 635.

Sl. No.	Name of Hospital	Table 3.35: EEG					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	355	276	406	533	476	2046
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	0	0	0	0	0	0
4	District Hospital, Champhai	0	0	0	0	0	0
5	District Hospital, Serchhip	0	0	0	0	0	0
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	0	0	0	0	0	0
	Total	355	276	406	533	476	2046

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.35) shows the number of EEG done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest EEG done throughout the study period, i.e., 2016-21 with 2046 EEG done during this period. All other Public Healthcare establishments have recorded a nil or zero EEG done during the study period, i.e., 2016-21 due to unavailability of machine, equipment and medical personnel required to perform the said investigation.

The total EEG done is highest in 2019-20 with 533 and lowest in 2017-18 with 276 between 2016 and 2021. The cumulative total recorded EEG done during the study period (i.e., 2016-21) is 2046.

Sl. No.	Name of Hospital	Table 3.36: PFT					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	195	67	140	67	46	515
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	0	0	0	0	0	0
4	District Hospital, Champhai	0	0	0	0	0	0
5	District Hospital, Serchhip	0	0	0	0	0	0
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	0	0	0	0	0	0
	Total	195	67	140	67	46	515

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.36) shows the number of PFT done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest PFT done throughout the study period, i.e., 2016-21 with 515 PFT done during this period. All other Public Healthcare establishments have recorded a nil or zero PFT done during the study period, i.e., 2016-21 due to unavailability of machine, equipment and medical personnel required to perform the said investigation.

The total PFT done is highest in 2019-17 with 195 and lowest in 2020-21 with 46 between 2016 and 2021. The cumulative total recorded PFT done during the study period (i.e., 2016-21) is 515.

Sl. No.	Name of Hospital	Table 3.37: Dialysis					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	1386	2686	3620	3806	4673	16171
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	444	146	862	689	1003	3144
4	District Hospital, Champhai	0	0	0	6	45	51
5	District Hospital, Serchhip	0	0	0	0	45	45
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	0	0	0	0	0	0
	Total	1830	2832	4482	4501	5766	19411

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.37) shows the number of dialysis done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest dialysis done throughout the study period, i.e., 2016-21 with 16171 followed by Civil Hospital, Lunglei with 3144 dialysis done during this period. District Hospitals, Champhai and Serchhip have recorded a modicum amount of dialysis done during the study period, i.e., 2016-21 with 51 and 45 respectively. All other Public Healthcare establishments have recorded a nil or zero dialysis done during the study period, i.e., 2016-21 due to unavailability of machine, equipment and medical personnel required to perform the said investigation.

The total dialysis done is highest in 2020-21 with 5766 and lowest in 2016-17 with 1830 between 2016 and 2021. The cumulative total recorded dialysis done during the study period (i.e., 2016-21) is 19411.

Sl. No.	Name of Hospital	Table 3.38: Bronchoscopy					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	0	9	96	137	207	449
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	0	0	0	0	0	0
4	District Hospital, Champhai	0	0	0	0	0	0
5	District Hospital, Serchhip	0	0	0	0	0	0
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	0	0	16	41	0	57
	Total	0	9	112	178	207	506

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.38) shows the number of bronchoscopies done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest bronchoscopies done throughout the study period, i.e., 2016-21 with 449 followed by Referral Hospital, Falkawn with 57 bronchoscopies done during this period. All other Public Healthcare establishments have recorded a nil or zero bronchoscopy done during the study period, i.e., 2016-21 due to unavailability of machine, equipment and medical personnel required to perform the said investigation.

The total bronchoscopies done is highest in 2020-21 with 207 and lowest in 2016-17 with nil or zero between 2016 and 2021. The cumulative total recorded bronchoscopies done during the study period (i.e., 2016-21) is 506.

Sl. No.	Name of Hospital	Table 3.39: Radiotherapy					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	0	0	0	0	0	0
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	0	0	0	0	0	0
4	District Hospital, Champhai	0	0	0	0	0	0
5	District Hospital, Serchhip	0	0	0	0	0	0
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	8739	11152	12082	14079	8486	54538
11	Referral Hospital, Falkawn	0	0	0	0	0	0
	Total	8739	11152	12082	14079	8486	54538

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.39) shows the number of radiotherapies done across various Public Hospitals in Mizoram during 2016-21. Regional Cancer Centre has the highest radiotherapies done throughout the study period, i.e., 2016-21 with 54538 during this period. All other Public Healthcare establishments have recorded a nil or zero radiotherapies done during the study period, i.e., 2016-21 due to unavailability of machine, equipment and medical personnel required to perform the said investigation.

The total radiotherapies done is highest in 2019-20 with 14079 and lowest in 2020-21 with 8486 between 2016 and 2021. The cumulative total recorded radiotherapies done during the study period (i.e., 2016-21) is 54538.

Sl. No.	Name of Hospital	Table 3.40: Echo					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	1286	1087	1730	1528	334	5965
2	Kulikawn Hospital	0	0	0	0	0	0
3	Civil Hospital, Lunglei	0	0	0	0	0	0
4	District Hospital, Champhai	0	0	0	0	0	0
5	District Hospital, Serchhip	0	0	0	0	0	0
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	0	0	0	0	0	0
11	Referral Hospital, Falkawn	0	0	541	497	13	1051
	Total	1286	1087	2271	2025	347	7016

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.40) shows the number of echo done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest echo done throughout the study period, i.e., 2016-21 with 5965 followed by Referral Hospital, Falkawn with 1051 during this period. All other Public Healthcare establishments have recorded a nil or zero echo done during the study period, i.e., 2016-21 due to unavailability of machine, equipment and medical personnel required to perform the said investigation.

The total echo done is highest in 2018-19 with 2271 and lowest in 2020-21 with 347 between 2016 and 2021. The cumulative total recorded echo done during the study period (i.e., 2016-21) is 7016.

Sl. No.	Name of Hospital	Table 3.41: CT scan					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Civil Hospital, Aizawl	4261	3485	3787	2291	3071	16895
2	Kulikawn Hospital	0	0	0	0	1	1
3	Civil Hospital, Lunglei	0	0	353	718	994	2065
4	District Hospital, Champhai	0	0	0	0	0	0
5	District Hospital, Serchhip	0	0	0	0	0	0
6	District Hospital, Siaha	0	0	0	0	0	0
7	District Hospital, Kolasib	0	0	0	0	0	0
8	District Hospital, Mamit	0	0	0	0	0	0
9	District Hospital, Lawngtlai	0	0	0	0	0	0
10	Regional Cancer Centre	1370	1671	1850	1614	150	6655
11	Referral Hospital, Falkawn	0	0	0	236	362	598
	Total	5631	5156	5990	4859	4578	26214

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table (i.e., table 3.41) shows the number of CT scan done across various Public Hospitals in Mizoram during 2016-21. Civil Hospital, Aizawl has the highest CT scan done throughout the study period, i.e., 2016-21 with 16895 followed by Regional Cancer Centre, Civil Hospital, Lunglei, Referral Hospital, Falkawn and Kulikawn Hospital with 6655, 2065, 598 and 1 respectively during this period. All other Public Healthcare establishments have recorded a nil or zero CT scan done during the study period, i.e., 2016-21 due to unavailability of machine, equipment and medical personnel required to perform the said investigation.

The total CT scan done is highest in 2018-19 with 5990 and lowest in 2020-21 with 4578 between 2016 and 2021. The cumulative total recorded CT scan done during the study period (i.e., 2016-21) is 26214.

3.5: SECTION–D: Brief Comparison of Public and Private Hospitals' Performance in Mizoram

In this section, i.e., Section–F, a brief comparison of public and private healthcare providers' performance in Mizoram is analyzed. This is a brief and concise review of the institutional provisions between public and private healthcare providers, viz., total patient care in both out-patient and in-patient department. The economic analysis mainly pertains to the demographic features of patient care, such as the difference in the number of patient care and total census etc. between 2016 and 2021. The following tables highlight the institutional provision of patient care between public and private hospitals in Mizoram:

Table 3.42: Total Patient Care in OPD

Sl. No.	Name of the Hospitals	*OPD*					Total
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Public Hospitals	616949	649194	726874	798216	515663	3306896
2	Private Hospitals	204090	196101	211213	216365	181369	1009138
	Total	821039	845295	938087	1014581	697032	4316034

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.42 shows the total patient care in out-patient department by public and private hospitals in Mizoram from 2016 to 2021. It can be seen that total patient care is much higher in public hospitals with a cumulative total of 3306896 while it is barely 1009138 cumulative total in private hospitals during 2016-21. Total patient care in out-patient department is highest in 2019-20 in public hospitals with 798216 total patient care and lowest in 2020-21 with 515663; while in private hospitals, total patient care is highest in 2019-20 with 211213 and lowest in 2020-21 with 181369. In the same manner, total patient care in both public and private hospitals in out-patient department is highest in 2019-20 with 1014581 and lowest in 2020-21 with 697032. The cumulative total of public and private hospitals' total patient care in out-patient department is 4316034 between 2016 and 2021. The trend in total patient care in out-patient department is increasing over time except for the last year which is an anomaly, mainly due to the Covid-19 pandemic.

Table 3.43: Total Patient Care in Casualty							
Sl. No.	**Name of the Hospitals**	***Casualty***					**Total**
		2016-17	***2017-18***	***2018-19***	***2019-20***	***2020-21***	
1	Public Hospitals	101434	92759	94117	101485	72476	462271
2	Private Hospitals	44865	59885	82977	89535	59672	336934
	Total	146299	152644	177094	191020	132148	799205

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.43 shows the total patient care in casualty or emergency department by public and private hospitals in Mizoram from 2016 to 2021. It can be seen that total patient care is much higher in public hospitals with a cumulative total of 462271 as compared to 336934 cumulative total in private hospitals during 2016-21. Total patient care in casualty or emergency is highest in 2019-20 in public hospitals with 101485 total patient care and lowest in 2020-21 with 72476; while in private hospitals, total patient care is highest in 2019-20 with 89535 and lowest in 2016-17 with 44865. In the same manner, total patient care in casualty or emergency department in both public and private hospitals is highest in 2019-20 with 191020 and lowest in 2020-21 with 697032. The cumulative total of public and private hospitals' total patient care is 4316034 between 2016 and 2021. The trend in total patient in casualty or emergency is increasing over time except for the last year which is an anomaly, mainly due to the Covid-19 pandemic.

Table 3.44: Total Admission from OPD							
Sl. No.	**Name of the Hospitals**	***OPD***					**Total**
		2016-17	***2017-18***	***2018-19***	***2019-20***	***2020-21***	
1	Public Hospitals	39116	38237	40395	39957	32087	189792
2	Private Hospitals	35876	33805	37674	41798	34533	183686
	Total	74992	72042	78069	81755	66620	373478

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.44 shows the total admission from OPD in public and private hospitals in Mizoram from 2016 to 2021. It can be seen that total admissions from OPD are almost similar with minimal differences in public and private hospitals with a cumulative total of 189792 and 183686 respectively during 2016-21. Total admission from OPD is highest in 2018-19 in public hospitals with 40395 and lowest in 2020-21 with 32087; while in private hospitals, total admission from OPD is highest in 2019-20 with 41798 and lowest in 2017-18 with 33805. In the same manner, total admissions from OPD in both public and private hospitals are highest in 2019-20 with 81755 and lowest in 2020-21 with 66620. The cumulative total of public and private hospitals' total admissions from OPD is 373478 between 2016 and 2021.

The trend in total admission from OPD is fluctuating over the years and plummeted in the last year mainly due to the Covid-19 pandemic. It can be seen from the table, i.e., table 3.66 that there is a fluctuating trend in total admissions from OPD in public hospitals with 39116 in the first year, 38237 in the second year, 40935 in the third year, 39957 in the fourth year and 32087 in the last year, i.e., from 2016 to 2021. Similarly, private hospitals also exhibit a fluctuating trend in total admissions from OPD with 35876, 33805, 97674, 41798 and 34533 respectively over the study period, i.e., 2016 to 2021.

Table 3.45: Total Admission from Casualty

Sl. No.	Name of the Hospitals	*Casualty*					Total
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Public Hospitals	7303	8795	7122	6429	6942	36591
2	Private Hospitals	11220	12165	14661	10920	9237	58203
	Total	18523	20960	21783	17349	16179	94794

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.45 shows the total admission from casualty in public and private hospitals in Mizoram from 2016 to 2021. It can be seen that total admissions from casualty are higher in private than public hospitals with a cumulative total of 58203 and 36591 respectively during 2016-21. Total admission from casualty is highest in 2018-19 in private hospitals with 14661 and lowest in 2020-21 with 9237; while in public hospitals, total admission from casualty is highest in 2017-18 with 8795 and lowest in 2019-20 with 6429. In the same manner, total admissions from casualty in both public and private hospitals are highest in 2018-19 with 21783 and lowest in 2020-21 with 16179. The cumulative total of public and private hospitals' total admissions from casualty is 94794 between 2016 and 2021.

The trend in total admission from casualty is fluctuating over the years and plummeted in private but increase in public hospitals in the last year mainly due to the Covid-19 pandemic. It can be seen from the table, i.e., table 3.67 that there is a fluctuating trend in total admissions from casualty in public hospitals with 7303 in the first year, 8795 in the second year, 7122 in the third year, 6429 in the fourth year and 6942 in the last year, i.e., from 2016 to 2021. Similarly, private hospitals also exhibit a fluctuating trend in total admissions from casualty with 11220, 12165, 14661, 10920 and 9237 respectively over the study period, i.e., 2016 to 2021.

Table 3.46: Minor Operations Done

Sl. No.	Name of the Hospitals	*Minor*					Total
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Public Hospitals	28089	25315	26513	23936	15401	119254
2	Private Hospitals	6086	6115	7715	7883	7665	35464
	Total	34175	31430	34228	31819	23066	154718

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.46 shows minor operations done in public and private hospitals in Mizoram from 2016 to 2021. It can be seen that minor operations done are much higher in public than private hospitals with a cumulative total of 119254

and 35464 respectively during 2016-21. Total minor operations done is highest in 2016-17 in public hospitals with 28089 and lowest in 2020-21 with 15401; while in private hospitals, total minor operations done is highest in 2019-20 with 7883 and lowest in 2016-17 with 6086. In the same manner, total minor operations done in both public and private hospitals are highest in 2018-19 with 34228 and lowest in 2020-21 with 23066. The cumulative total of public and private hospitals' total minor operations done is 154718 between 2016 and 2021.

The trend in total minor operations done is fluctuating over the years and plummeted in both public and private hospitals in the last year mainly due to the Covid-19 pandemic. It can be seen from the table, i.e., table 3.68 that there is a fluctuating trend in total minor operations done in public hospitals with 28089 in the first year, 25315 in the second year, 26513 in the third year, 23936 in the fourth year and 15401 in the last year, i.e., from 2016 to 2021. Similarly, private hospitals also exhibit a fluctuating trend in total minor operations done with 6086, 6115, 7715, 7883 and 7665 respectively over the study period, i.e., 2016 to 2021.

3.47: Major Operations Done

Sl. No.	Name of the Hospitals	*Major*					Total
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Public Hospitals	9971	10386	11617	12166	7855	51995
2	Private Hospitals	8173	7659	8877	7721	8105	40535
	Total	18144	18045	20494	19887	15960	92530

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.47 shows major operations done in public and private hospitals in Mizoram from 2016 to 2021. It can be seen that major operations done are relatively higher in public than private hospitals with a cumulative total of 51995 and 40535 respectively during 2016-21. Total major operations done is highest in 2019-20 in public hospitals with 12166 and lowest in 2020-21 with 7855; while in private hospitals, total major operations done is highest in 2018-19 with 8877 and lowest in 2017-18 with 7659. In the same manner, total major operations done in both public and private hospitals are highest in 2018-19 with 20494 and lowest in 2020-21

with 15960. The cumulative total of public and private hospitals' total major operations done is 92530 between 2016 and 2021.

The trend in total major operations done is fluctuating over the years and plummeted in public but rise in private hospitals in the last year mainly due to the Covid-19 pandemic. It can be seen from the table, i.e., table 3.69 that there is a fluctuating trend in total major operations done in public hospitals with 9971 in the first year, 10386 in the second year, 11617 in the third year, 12166 in the fourth year and 7855 in the last year, i.e., from 2016 to 2021. Similarly, private hospitals also exhibit a fluctuating trend in total major operations done with 8173, 7659, 8877, 7721 and 8105 respectively over the study period, i.e., 2016 to 2021.

Table 3.48: Male Child Delivery

Sl. No.	Name of the Hospitals	*Male*					Total
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Public Hospitals	4471	4538	4654	4882	4327	22872
2	Private Hospitals	1946	2026	2090	2165	2538	10765
	Total	6417	6564	6744	7047	6865	33637

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.48 shows male child delivery in public and private hospitals in Mizoram from 2016 to 2021. It can be seen that male child delivery are higher in public than private hospitals with a cumulative total of 22872 and 10765 respectively during 2016-21. Total male child delivery is highest in 2019-20 in public hospitals with 4882 and lowest in 2020-21 with 4327; while in private hospitals, total male child delivery is highest in 2020-21 with 2538 and lowest in 2016-17 with 1946. In the same manner, total male child delivery in both public and private hospitals is highest in 2019-20 with 7047 and lowest in 2016-17 with 6417. The cumulative total of public and private hospitals' total male child delivery is 33637 between 2016 and 2021.

The trend in total male child delivery is increasing over the years but plummeted in public while it rises in private hospitals in the last year mainly due to the Covid-19 pandemic. It can be seen from the table, i.e., table 3.70 that there is an increasing trend in total male child delivery in public hospitals with 4471 in the first year, 4538 in the second year, 4654 in the third year, 4882 in the fourth year and 4327 in the last year, i.e., from 2016 to 2021. Similarly, private hospitals also elicit an increasing trend in total male child delivery with 1946, 2026, 2090, 2165 and 2538 respectively over the study period, i.e., 2016 to 2021.

Table 3.49: Female Child Delivery

Sl. No.	Name of the Hospitals	*Female*					Total
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Public Hospitals	4392	4512	4519	4771	4346	22540
2	Private Hospitals	1906	1997	2067	2058	2357	10385
	Total	6298	6509	6586	6829	6703	32925

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.49 shows female child delivery in public and private hospitals in Mizoram from 2016 to 2021. It can be seen that female child delivery are higher in public than private hospitals with a cumulative total of 22540 and 10385 respectively during 2016-21. Total female child delivery is highest in 2019-20 in public hospitals with 4771 and lowest in 2020-21 with 4346; while in private hospitals, total female child delivery is highest in 2020-21 with 2357 and lowest in 2016-17 with 1906. In the same manner, total female child delivery in both public and private hospitals is highest in 2019-20 with 6829 and lowest in 2016-17 with 1906. The cumulative total of public and private hospitals' total female child delivery is 32925 between 2016 and 2021.

The trend in total female child delivery is increasing over the years but decreases in public while it rises in private hospitals in the last year mainly due to the Covid-19 pandemic. It can be seen from the table, i.e., table 3.71 that there is an increasing trend in total female child delivery in public hospitals with 4392 in the first year, 4512 in the second year, 4519 in the third year, 4771 in the fourth year and 4346

in the last year, i.e., from 2016 to 2021. Similarly, private hospitals also show an increasing trend in total female child delivery with 1906, 1997, 2067, 2058 and 2357 respectively over the study period, i.e., 2016 to 2021.

Table 3.50: Male Still Birth

Sl. No.	Name of the Hospitals	*Male*					Total
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Public Hospitals	61	41	52	26	36	216
2	Private Hospitals	9	13	16	19	19	76
	Total	70	54	68	45	55	292

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.50 shows male still birth in public and private hospitals in Mizoram from 2016 to 2021. It can be seen that male still birth is higher in public than private hospitals with a cumulative total of 216 and 76 respectively during 2016-21. Total male still birth is highest in 2016-17 in public hospitals with 61 and lowest in 2019-20 with 26; while in private hospitals, total male still birth is highest in 2019-20 and 2020-21 with 19 respectively and lowest in 2016-17 with 9. In the same manner, total male still birth in both public and private hospitals is highest in 2016-17 with 70 and lowest in 2019-20 with 45. The cumulative total of public and private hospitals' total male still birth is 292 between 2016 and 2021.

The trend in male still birth is fluctuating over the years. It can be seen from the table, i.e., table 3.72 that there is a fluctuating trend in total male still birth in public hospitals with 61 in the first year, 41 in the second year, 52 in the third year, 26 in the fourth year and 36 in the last year, i.e., from 2016 to 2021. Similarly, private hospitals also show a fluctuating trend in total male still birth with 9, 13, 16, 19 and 19 respectively over the study period, i.e., 2016 to 2021.

Table 3.51: Female Still Birth							
Sl. No.	Name of the Hospitals	*Female*					Total
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Public Hospitals	46	48	36	26	32	188
2	Private Hospitals	13	16	17	9	8	63
	Total	59	64	53	35	40	251

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.51 shows female still birth in public and private hospitals in Mizoram from 2016 to 2021. It can be seen that female still birth is higher in public than private hospitals with a cumulative total of 188 and 63 respectively during 2016-21. Total female still birth is highest in 2017-18 in public hospitals with 48 and lowest in 2019-20 with 26; while in private hospitals, total female still birth is highest in 2018-19 with 17 and lowest in 2020-21 with 8. In the same manner, total female still birth in both public and private hospitals is highest in 2016-17 with 59 and lowest in 2019-20 with 35. The cumulative total of public and private hospitals' total female still birth is 251 between 2016 and 2021.

The trend in female still birth is fluctuating over the years. It can be seen from the table, i.e., table 3.72 that there is a fluctuating trend in total female still birth in public hospitals with 46 in the first year, 48 in the second year, 36 in the third year, 26 in the fourth year and 32 in the last year, i.e., from 2016 to 2021. Similarly, private hospitals also show a fluctuating trend in total female still birth with 13, 16, 17, 9 and 8 respectively over the study period, i.e., 2016 to 2021.

Table 3.52: Live Discharge							
Sl. No.	Name of the Hospitals	*Live*					Total
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Public Hospitals	42033	42892	42548	41630	32885	201988
2	Private Hospitals	45740	43931	48648	48617	40332	227268
	Total	87773	86823	91196	90247	73217	429256

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.52 shows live discharge in public and private hospitals in Mizoram from 2016 to 2021. It can be seen that live discharge is higher in private than public hospitals with a cumulative total of 227268 and 201988 respectively during 2016-21. Total live discharge is highest in 2018-19 in private hospitals with 48648 and lowest in 2020-21 with 40332; while in public hospitals, total live discharge is highest in 2017-18 with 42892 and lowest in 2020-21 with 32885. In the same manner, total live discharge in both public and private hospitals is highest in 2018-19 with 91196 and lowest in 2020-21 with 73217. The cumulative total of public and private hospitals' total live discharge is 429256 between 2016 and 2021.

The trend in live discharge is fluctuating over the years. It can be seen from the table, i.e., table 3.74 that there is a fluctuating trend in total live discharge in public hospitals with 42033 in the first year, 42892 in the second year, 42548 in the third year, 41630 in the fourth year and 32885 in the last year, i.e., from 2016 to 2021. Similarly, private hospitals also show a fluctuating trend in total live discharge with 45740, 43931, 48648, 48617 and 40332 respectively over the study period, i.e., 2016 to 2021.

Table 3.53: Death Discharge							
Sl. No.	Name of the Hospitals	*Death*					Total
		2016-17	*2017-18*	*2018-19*	*2019-20*	*2020-21*	
1	Public Hospitals	1483	1352	1516	1536	1271	7158
2	Private Hospitals	1393	1269	1441	1456	1431	6990
	Total	2876	2621	2957	2992	2702	14148

Source: Hospital Statistics 2016-21, DH&ME, Govt. of Mizoram

The above table, i.e., table 3.53 shows death discharge in public and private hospitals in Mizoram from 2016 to 2021. It can be seen that death discharge is higher in public than private hospitals with a cumulative total of 7158 and 6990 respectively during 2016-21. Total death discharge is highest in 2019-20 in public hospitals with 1536 and lowest in 2020-21 with 1271; while in private hospitals, total death discharge is highest in 2019-20 with 1456 and lowest in 2016-17 with 1393. In the same manner, total death discharge in both public and private hospitals is highest in 2019-20 with 2992 and lowest in 2017-18 with 2621. The cumulative total of public and private hospitals' total death discharge is 14148 between 2016 and 2021.

The trend in death discharge is fluctuating over the years. It can be seen from the table, i.e., table 3.75 that there is a fluctuating trend in total death discharge in public hospitals with 1483 in the first year, 1352 in the second year, 1516 in the third year, 1536 in the fourth year and 1271 in the last year, i.e., from 2016 to 2021. Similarly, private hospitals also show a fluctuating trend in total death discharge with 1393, 1269, 1441, 1456 and 1431 respectively over the study period, i.e., 2016 to 2021.

CHAPTER-IV

ANALYSIS OF ECONOMIC WELFARE, EFFICIENCY AND PRODUCTIVITY

4.1: INTRODUCTION

In this Chapter, i.e., Chapter IV, the first Section, i.e., Section–A shows Economic Welfare Provision in terms of monetary incentives or saving for consulting healthcare services provided by various Public Hospitals across Mizoram is analyzed using various concepts and theoretical framework of economic literature. The detailed step-by-step calculation is shown in the methodology portion of the first chapter. Nevertheless, some intricate basic measurements of Economic Welfare Provision are–(i) Average Cost of availing healthcare services as compared to private healthcare providers or opportunity cost for employing Public Hospitals; (ii) Average Opportunity Cost adjusted for inflation in order to inquire about real change in monetary welfare. The following tables and figures highlight the various trends and pattern of monetary welfare provision across various departments, viz., Out-patient, In-patient and Investigation and follow-up, that accrue to the beneficiaries of Public Hospitals in Mizoram.

In the next Section, i.e., Section–B, efficiency and productivity of various Public Hospitals in Mizoram is analyzed using Malmquist Productivity Index (MPI)–a variation of Data Envelopment Analysis (DEA). MPI evaluates the efficiency change over time as mentioned by Färe, Grosskopf & Margaritis (2011). The results are divided into three parts: (i) Distance summaries; (ii) Malmquist year-wise index summaries; and (iii) Annual and firm mean productivity index.

4.2.: SECTION–A: ECONOMIC WELFARE PROVISION

The following tables and graphs show the calculation and analysis of economic welfare provision across various Public Hospital establishment across Mizoram.

4.2.1: Cost or Market Price of Healthcare Provision in Public and Private Hospitals

In this sub-section, the following tables and figures highlight the cost or market price of healthcare provision or differences in cost of availing healthcare services between Public Hospitals and Private Clinics or Hospitals in Mizoram. Average Cost of investigations and follow-up is first elucidated followed by other average costs of availing healthcare services

such as Out-patient consultation, In-patient stay, major and minor operations. It is also noteworthy that in the calculation of the average cost, certain outliers such as–certain type of X-Rays, CT scans and other investigations that deviate too much from the mean due to their frequency being too low as compared to the most common kind of investigations being done, have been omitted in order to elicit comprehensible and meaningful data that pertains to the core interest of this research.

Table 4.1: Average Cost of Investigations as Compared to Private Clinic

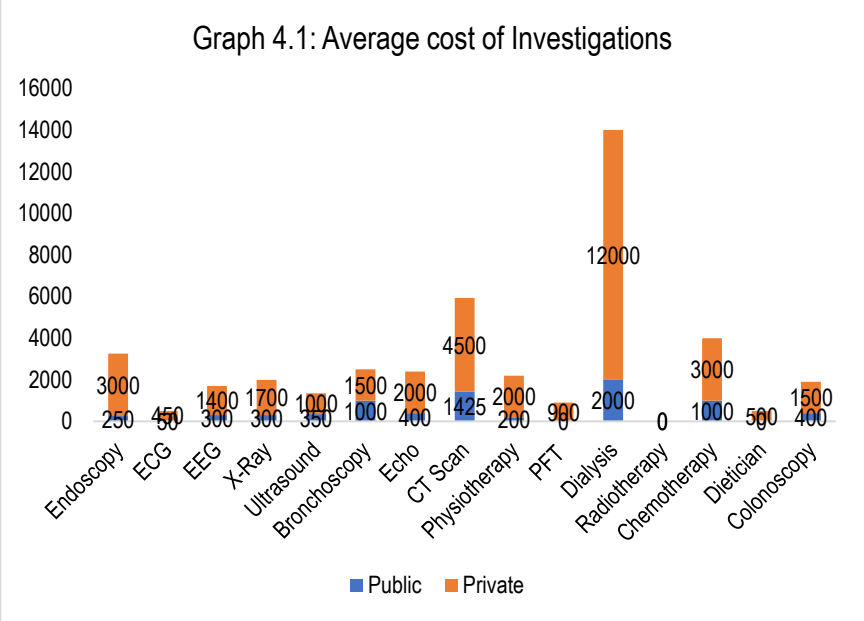
Sl. No.	Name of Investigation	Public Rate [INR]	Private Rate [INR]
1	Laboratory	125	490
2	Endoscopy	250	3000
3	ECG	50	450
4	EEG	300	1400
5	X-Ray	300	1700
6	Ultrasound	350	1000
7	Bronchoscopy	1000	1500
8	Echo	400	2000
9	CT Scan	1425	4500
10	Physiotherapy	200 [10 Days]	2000 [10 Days]
11	PFT	FREE	900
12	Dialysis	2000	12000
13	Radiotherapy	FREE	NA
14	Chemotherapy	1000	3000
15	Dietician	FREE	500
16	Colonoscopy	400	1500

Source: Field Survey, 2022

The above table, i.e., Table 4.1 shows the average cost of investigation as compared to private clinics or healthcare providers. Laboratory investigations (Microbiology, Pathology, Biochemistry) have an average cost of ₹125 in Public Hospitals while its average cost is ₹490 in private clinics. Radiotherapy and PFT is free of cost in Public Hospitals while the former cannot be done by private clinic and the latter being cost at ₹900 in private clinic.

The highest average cost difference with regard to various investigations is found in dialysis, which has an average cost of ₹2000 while its average cost is ₹12000 in private clinics or hospitals. The lowest average cost difference is found in ECG which costs on average ₹50 in public hospitals while ₹450 in private clinic and hospitals. Also, due to the nature of the treatment and cost of pharmaceutical appurtenances, the average cost difference in chemotherapy is low which, on average costs ₹1000 in public hospitals and ₹3000 in private hospitals.

The following figure, i.e., graph 3.4 clearly highlights the average cost differences of various investigations between public and private healthcare providers in Mizoram–



The above figure (i.e., Graph 3.4) highlights the average cost of investigations and follow-up between public and private healthcare providers in Mizoram.

Table 4.2: Average Cost (Others) as Compared to Private Hospitals			
Sl. No.	**Name of Service**	**Civil Rate [INR]**	**Private Rate [INR]**
1	In-patient Stay	0	1600
2	Out-patient Consultation	10	300
3	Minor Operations	0	7437
4	Major Operations	0	26562

Source: Field Survey, 2022

The above table, i.e., Table 3.43 shows the average cost of other healthcare services between public and private hospitals in Mizoram. In-patient cost is nil in public hospitals as the government provided free of cost while the average cost of in-patient stay in private hospitals is ₹1600. Out-patient consultation has an actual cost of ₹10 while the average cost of out-patient consultation in private hospitals is ₹300. Major and minor operations have zero cost in public hospitals while the average cost of the same are ₹7437 and ₹26562 respectively in private hospitals.

4.2.2: Economic Welfare or Monetary Savings Accruing to Public Healthcare Beneficiaries

In this sub-section, economic welfare or monetary savings that accrue to Public Healthcare beneficiaries highlighted. The procedure is a continuation of the calculation of average cost of various healthcare provision translated into market prices in order to evoke the actual monetary compensation in current as well as constant terms.

Various aspects of healthcare provisions such as investigations, out-patient consultation, in-patient stay and minor and major operations being done during the study period, i.e., 2016-17 to 2020-21 is analyzed in terms of comparison of average cost of healthcare provision between public and private healthcare providers in monetary terms. The following tables show the various monetary compensation that accrue to public healthcare beneficiaries when they forgo the next best alternative available.

Table 4.3: Total Cost of Investigation and follow-up in Govt. Hospitals			
Sl. No.	***Year***	***Actual [in INR]***	***Inflation adjusted [2012 in INR]***
1	2016-17	517,401,350	400,775,639
2	2017-18	469,632,500	353,372,836
3	2018-19	660,738,775	479,839,342
4	2019-20	758,408,750	667,616,336
5	2020-21	594,193,650	474,216,799
	Total	3,000,375,025	2,375,820,952

Source: Field Survey, 2022

The above table, i.e., table 3.44 shows the total cost of investigations and follow-up in various Public Hospitals between 2016-17 and 2020-21. The actual average cost of investigation and follow-up is ₹517,401,350 in 2016-17; ₹469,632,500 in 2017-18; ₹660,738,775 in 2018-19; ₹758,408,750 in 2019-20; ₹594,193,650 in 2020-21 respectively. The total actual average cost of investigation and follow-up during the study period, i.e., 2016-17 to 2020-21 is ₹3,000,375,025. The actual cost is highest in 2019-20 with ₹758,408,750 and lowest in 2017-18 with ₹469,632,500. When these actual costs are adjusted for inflation, the total actual cost is reduced to ₹2,375,820,952. Inflation adjusted actual average cost of investigations and follow-up is highest in 2019-20 with ₹479,839,342 and lowest in 2017-18 with ₹353,372,836.

Table 4.4: Total Cost of Investigation When Compared to Opportunity Cost			
Sl. No.	***Year***	***Opportunity Cost [OC in INR]***	***Inflation adjusted OC [INR]***
1	2016-17	2,581,560,420	1,999,659,504
2	2017-18	2,343,219,000	1,763,144,469
3	2018-19	3,296,738,730	2,394,145,773
4	2019-20	3,784,060,500	3,331,039,172
5	2020-21	2,964,713,580	2,366,092,242
	Total	14,970,292,230	11,854,081,160

Source: Field Survey, 2022

The above table, i.e., table 4.4 shows the total cost of investigations and follow-up when compared to its opportunity cost between 2016-17 and 2020-21. The actual average opportunity cost of investigation and follow-up is ₹2,581,560,420 in 2016-17; ₹2,343,219,000 in 2017-18; ₹3,296,738,730 in 2018-19; ₹3,784,060,500 in 2019-20; ₹2,964,713,580 in 2020-21 respectively. The total average opportunity cost of investigation and follow-up during the study period, i.e., 2016-17 to 2020-21 is ₹14,970,292,230. The average opportunity cost is highest in 2019-20 with ₹3,784,060,500 and lowest in 2017-18 with ₹2,343,219,000. When these opportunity costs are adjusted for inflation, the total actual cost is reduced to ₹11,854,081,160. Inflation adjusted opportunity cost of investigations and follow-up is highest in 2019-20 with ₹3,331,039,172 and lowest in 2017-18 with ₹1,763,144,469.

Overall, from the above table, i.e., table 4.4, it can be seen that there has been a real increase in opportunity cost during the study period since cost adjusted for inflation is gradually increasing year by year during the study period, i.e., 2016-17 to 2020-21.

Table 4.5: Monetary Compensation to The Public for Employing Public Hospitals

Sl. No.	*Year*	*Monetary Savings [OC-A in INR]*	*Inflation Adjusted MS [in INR]*
1	2016-17	2,064,159,070	1,598,883,865
2	2017-18	1,873,586,500	1,409,771,632
3	2018-19	2,635,999,955	1,914,306,430
4	2019-20	3,025,651,750	2,663,425,836
5	2020-21	2,370,519,930	1,891,875,442
	Total	11,969,917,205	9,478,263,205

Source: Field Survey, 2022

The above table, i.e., table 4.5 shows the total monetary compensation in investigations and follow-up to the public for employing public hospitals between 2016-17 and 2020-21. The actual monetary compensation–expressed as the difference between actual and opportunity cost–in investigation and follow-up is ₹2,064,159,070 in 2016-17; ₹1,873,586,500 in 2017-18; ₹2,635,999,955 in 2018-19; ₹3,025,651,750 in 2019-20; ₹2,370,519,930 in 2020-21 respectively. The total monetary compensation in investigations

and follow-up to the public for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹11,969,917,205. The total monetary savings is highest in 2019-20 with ₹3,025,651,750 and lowest in 2017-18 with ₹1,873,586,500. When these monetary compensations are adjusted for inflation, the total actual monetary compensation is reduced to ₹9,478,263,205. Inflation adjusted monetary compensation in investigations and follow-up is highest in 2019-20 with ₹2,663,425,836 and lowest in 2017-18 with ₹1,409,771,632.

Overall, from the above table, i.e., table 4.5, it can be seen that there have been fluctuations in monetary compensation to the beneficiaries for employing Public Hospitals during the study period, i.e., 2016-17 to 2020-21.

Table 4.6: Cost of Public Hospitals Out-patient Department

Sl. No.	*Year*	*Actual Cost [in INR]*	*Inflation adjusted [2012]*
1	2016-17	7,183,830	5,564,546
2	2017-18	7,419,530	5,582,791
3	2018-19	8,209,910	5,962,171
4	2019-20	8,997,010	7,919,903
5	2020-21	5,881,390	3,570,971
	Total	37,691,670	28,600,382

Source: Field Survey, 2022

The above table, i.e., table 4.6 shows the actual cost of public hospitals out-patient department between 2016-17 and 2020-21. The actual cost–expressed as the cost or consultation fee–in various public hospital establishment across Mizoram is ₹7,183,830 in 2016-17; ₹7,419,530 in 2017-18; ₹8,209,910 in 2018-19; ₹8,997,010 in 2019-20; ₹5,881,390 in 2020-21 respectively. The total actual cost for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹37,691,670. The total actual cost is highest in 2019-20 with ₹8,997,010 and lowest in 2016-17 with ₹7,183,830. When these actual costs are adjusted for inflation, the total actual cost is reduced to ₹28,600,382. Inflation adjusted total actual cost for availing healthcare services with regard to consultation of doctors is highest in 2019-20 with ₹7,919,903 and lowest in 2016-17 with ₹5,564,546.

Overall, from the above table, i.e., table 4.6, it can be seen that there has been a real increase in actual cost of out-patient department during the study period since cost adjusted for inflation is gradually increasing year by year during the study period, i.e., 2016-17 to 2020-21.

Table 4.7: Opportunity Cost of Public Hospitals Out-patient Department

Sl. No.	*Year*	*Actual OC [in INR]*	*Inflation adjusted [2012]*
1	2016-17	215,514,900	166,936,405
2	2017-18	222,585,900	167,483,747
3	2018-19	246,297,300	178,865,141
4	2019-20	269,910,300	237,597,095
5	2020-21	176,441,700	107,129,143
	Total	1,130,750,100	858,011,531

Source: Field Survey, 2022

The above table, i.e., table 4.7 shows the actual opportunity cost of public hospitals out-patient department between 2016-17 and 2020-21. The actual average opportunity cost– expressed as the differences in cost or consultation fee between public and private hospitals– in various hospital establishments across Mizoram is ₹215,514,900 in 2016-17; ₹222,585,900 in 2017-18; ₹246,297,300 in 2018-19; ₹269,910,300 in 2019-20; ₹176,441,700 in 2020-21 respectively. The total actual opportunity cost for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹1,130,750,100. The total actual opportunity cost is highest in 2019-20 with ₹269,910,300 and lowest in 2020-21 with ₹176,441,700. When these actual opportunity costs are adjusted for inflation, the total actual opportunity cost is reduced to ₹858,011,531. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to consultation of doctors is highest in 2019-20 with ₹237,597,095 and lowest in 2016-17 with ₹107,129,143.

Overall, from the above table, i.e., table 4.7, it can be seen that there has been a real increase in actual opportunity cost of out-patient department during the study period, i.e., 2016-17 to 2020-21 since cost adjusted for inflation is gradually increasing year by year

during the study period except for the last year which is an outlier due to the fact that most hospitals' consultation has been drastically limited due to the Covid-19 pandemic.

Table 4.8: Monetary Compensation to The Public for Employing Public Hospitals			
Sl. No.	***Year***	***Monetary Savings [OC-A in INR]***	***Inflation Adjusted MS***
1	2016-17	208,331,070	161,371,859
2	2017-18	215,166,370	161,900,955
3	2018-19	238,087,390	172,902,970
4	2019-20	260,913,290	229,677,192
5	2020-21	170,560,310	103,558,172
	Total	1,093,058,430	829,411,148

Source: Field Survey, 2022

The above table, i.e., table 4.8 shows the total monetary compensation in consultation of doctors to the public for employing public hospitals between 2016-17 and 2020-21. The actual monetary compensation–expressed as the difference between actual and opportunity cost–in consultation of doctors is ₹208,331,070 in 2016-17; ₹215,166,370 in 2017-18; ₹238,087,390 in 2018-19; ₹260,913,290 in 2019-20; ₹170,560,310 in 2020-21 respectively. The total monetary compensation in consultation of doctors to the public for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹1,093,058,430. The total monetary compensation is highest in 2019-20 with ₹260,913,290 and lowest in 2020-21 with ₹170,560,310. When these monetary compensations are adjusted for inflation, the total actual monetary compensation is reduced to ₹829,411,148. Inflation adjusted monetary compensation in consultation of doctors employed in public hospitals is highest in 2019-20 with ₹229,677,192 and lowest in 2020-21 with ₹103,558,172.

Overall, from the above table, i.e., table 4.8, that there has been a real increase in actual opportunity cost of out-patient department during the study period since cost adjusted for inflation is gradually increasing year by year during the study period, i.e., 2016-17 to 2020-21 except for the last year which is an outlier due to the fact that most public hospitals' consultation drastically plummeted due to the Covid-19 pandemic.

Table 4.9: Opportunity Cost of Public Hospitals in Minor Operations Done			
Sl. No.	***Year***	***Actual OC [in INR]***	***Inflation adjusted [2012]***
1	2016-17	208,897,893	161,810,916
2	2017-18	188,267,655	141,661,139
3	2018-19	197,177,181	143,193,305
4	2019-20	178,012,032	156,700,732
5	2020-21	114,537,237	69,542,948
	Total	886,891,998	672,909,040

Source: Field Survey, 2022

The above table, i.e., table 4.9 shows the actual opportunity cost of public hospitals' minor operations done between 2016-17 and 2020-21. The actual opportunity cost–expressed as the differences in cost of operations between public and private hospitals–in various hospital establishments across Mizoram is ₹208,897,893 in 2016-17; ₹188,267,655 in 2017-18; ₹197,177,181 in 2018-19; ₹178,012,032 in 2019-20; ₹114,537,237 in 2020-21 respectively. The total actual opportunity cost for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹886,891,998. The total actual opportunity cost is highest in 2016-17 with ₹208,897,893 and lowest in 2020-21 with ₹114,537,237. When these actual opportunity costs are adjusted for inflation, the total actual opportunity cost is reduced to ₹672,909,040. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to minor operations done is highest in 2016-17 with ₹161,810,916 and lowest in 2020-21 with ₹69,542,948.

Table 4.10: Opportunity Cost of Govt. Hospitals Major Operations Done			
Sl. No.	***Year***	***Actual OC (in INR)***	***Inflation adjusted (2012)***
1	2016-17	264,849,702	205,150,814
2	2017-18	275,872,932	207,579,331
3	2018-19	308,570,754	224,089,145
4	2019-20	323,153,292	284,465,926
5	2020-21	208,644,510	126,681,548
	Total	1,381,091,190	1,047,966,764

Source: Field Survey, 2022

The above table, i.e., table 4.10 shows the actual opportunity cost of public hospitals' major operations done between 2016-17 and 2020-21. The actual opportunity cost–expressed as the differences in cost of operations between public and private hospitals–in various hospital establishments across Mizoram is ₹264,849,702 in 2016-17; ₹275,872,932 in 2017-18; ₹308,570,754 in 2018-19; ₹323,153,292 in 2019-20; ₹208,644,510 in 2020-21 respectively. The total actual opportunity cost for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹1,381,091,190. The total actual opportunity cost is highest in 2019-20 with ₹323,153,292 and lowest in 2020-21 with ₹208,644,510. When these actual opportunity costs are adjusted for inflation, the total actual opportunity cost is reduced to ₹1,047,966,764. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to major operations done is highest in 2019-20 with ₹284,465,926 and lowest in 2020-21 with ₹126,681,548.

Overall, from the above table, i.e., table 4.10, that there has been a real increase in actual opportunity cost of major operations done during the study period since cost adjusted for inflation is gradually increasing year by year during the study period, i.e., 2016-17 to 2020-21 except for the last year which is an outlier due to the fact that most public hospitals' major operations sharply decrease due to the Covid-19 pandemic.

Table 4.11: Opportunity Cost of Public Hospitals In-patient Care			
Sl. No.	***Year***	***Actual OC [in INR]***	***Inflation adjusted [2012]***
1	2016-17	369,833,600	286,470,642
2	2017-18	379,833,600	285,804,063
3	2018-19	395,112,000	286,936,819
4	2019-20	422,782,400	372,167,605
5	2020-21	312,158,400	189,531,511
	Total	1,879,720,000	1,420,910,640

Source: Field Survey, 2022

The above table, i.e., table 4.11 shows the actual opportunity cost of public hospitals' in-patient care between 2016-17 and 2020-21. The actual opportunity cost–expressed as the differences in cost of in-patient stay between public and private hospitals–in various hospital establishments across Mizoram is ₹369,833,600 in 2016-17; ₹379,833,600 in 2017-18; ₹395,112,000 in 2018-19; ₹422,782,400 in 2019-20; ₹312,158,400 in 2020-21 respectively. The total actual opportunity cost for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹1,879,720,000. The total actual opportunity cost is highest in 2019-20 with ₹422,782,400 and lowest in 2020-21 with ₹312,158,400. When these actual opportunity costs are adjusted for inflation, the total actual opportunity cost is reduced to ₹1,420,910,640. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to in-patient care is highest in 2019-20 with ₹372,167,605 and lowest in 2020-21 with ₹189,531,511.

Overall, from the above table, i.e., table 4.11, it can be seen that there have been fluctuations in monetary compensation to the beneficiaries for employing Public Hospitals with regard to in-patient care during the study period, i.e., 2016-17 to 2020-21.

4.3: SECTION–B: Efficiency and Productivity Analysis of Public Hospitals in Mizoram

In this section, i.e., Section–B, efficiency and productivity of various Public Hospitals in Mizoram is analyzed using Malmquist Productivity Index (MPI)–a variation of Data Envelopment Analysis (DEA).

The analysis shows that four distances measurement or technical efficiencies done, T-1, T, T+1 under the ***CRS*** technical efficiency (te) and *VRS* technical efficiency (te) (Coelli, 2008). T-1 shows the technical efficiency of the previous year, t is the technical efficiency for the current year which is and T+1 is the corresponding year. Lastly, it should be noted that t-1 in year 1 and t+1 in the final year is not defined, which means if from the image T-1 column of year 1 shows 0.000 value and the same in T+1 for the final year. All the values calculated based on the previous year values. This means that, for the year one, T-1 will be the year 2015-16 and since the value is not available so, the technical efficiency values are 0.000. Similarly, in case if year 5, T+1 is 2021-22 and T is 2020-21, so the value for T+1 is not available and hence the technical efficiency values are 0.000.

In this particular analysis, there are 11 Decision Making Unit (DMU) or firms. Various Public Hospitals across Mizoram are assigned a particular firm number as follows–Firm no. 1 represents Civil Hospital, Aizawl; Firm no. 2 represents Kulikawn Hospital; Firm no. 3 represents Civil Hospital, Lunglei; Firm no. 4 represents District Hospital, Champhai; Firm no. 5 represents District Hospital, Serchhip; Firm no. 6 represents District Hospital, Siaha; Frim no. 7 represents District Hospital, Kolasib; Firm no. 8 represents District Hospital, Mamit; Firm no. 9 represents District Hospital, Lawngtlai; Firm no. 10 represents Regional Cancer Centre; and Firm no. 11 represents Referral Hospital, Falkawn respectively.

Table 4.12: Malmquist Distance Summary for 2016-17				
Firm no.	crs te rel to tech in yr			vrs te
	t-1	t	t+1	
1	0.000	1.000	1.259	1.000
2	0.000	0.301	0.229	0.302
3	0.000	0.993	0.835	1.000
4	0.000	0.961	0.793	0.962
5	0.000	1.000	0.942	1.000
6	0.000	1.000	1.110	1.000
7	0.000	1.000	1.072	1.000
8	0.000	1.000	1.247	1.000
9	0.000	0.876	0.641	1.000
10	0.000	0.481	0.453	0.510
11	0.000	0.753	0.648	0.889
Mean	0.000	0.851	0.839	0.878

Source: Own Calculation

The above table, i.e., table 4.12 shows output-oriented Malmquist Distance Summary for the year 2016-17. Firm no. 2, 3, 4, 9, 10 and 11 are technically inefficient when CRS (crs te) is assumed or they need to increase their output by 69.9, 0.7, 3.9, 12.4, 51.9, 24.7 percent respectively to become technically efficient in the year 2016-17. However, when VRS technical efficiency (vrs te) is assumed, only Firm 2, 4, 10 and 11 are technically inefficient but shows an increasing returns to scale–since vrs te is higher than crs te–where they need to increase their output by 69.8, 3.8, 49, 11.1 percent respectively in 2016-17. The rest of the DMUs or firms are technically efficient in both crs te and vrs te. All DMUs exhibit an increasing returns to scale in the year 2016-17. However, the total crs te and vrs te depicts that overall technical efficiency is not achieved since output is required to be increased by 14.9 percent when constant returns to scale is assumed and 11.1 percent when variable returns to scale is assumed in the year 2016-17.

Table 4.13: Malmquist Distance Summary for 2017-18				
Firm no.	crs te rel to tech in yr			vrs
	t-1	t	t+1	te
1	1.197	1.000	1.194	1.000
2	0.292	0.224	0.276	0.255
3	1.028	0.895	1.048	1.000
4	1.088	0.921	0.938	0.945
5	1.213	1.000	1.162	1.000
6	2.278	1.000	3.233	1.000
7	1.353	1.000	1.520	1.000
8	1.138	1.000	1.005	1.000
9	1.110	0.890	0.983	0.949
10	0.572	0.535	0.536	0.881
11	0.653	0.535	0.565	0.727
Mean	1.084	0.818	1.133	0.887

Source: Own Calculation

The above table, i.e., table 4.13 shows output-oriented Malmquist Distance Summary for the year 2017-18. Firm no. 2, 3, 4, 9, 10 and 11 are technically inefficient when CRS (crs te) is assumed or they need to increase their output by 77.6, 10.5, 7.9, 11, 46.5, 46.5 percent respectively to become technically efficient in the year 2017-18. However, when VRS technical efficiency (vrs te) is assumed, only Firm 2, 4, 9, 10 and 11 are technically inefficient but shows an increasing returns to scale–since vrs te is higher than crs te–where they need to increase their output by 74.5, 5.5, 5.1, 11.9, 27.3 percent respectively in 2017-18. The rest of the DMUs or firms are technically efficient in both crs te and vrs te. All DMUs exhibit an increasing return to scale in the year 2017-18. However, the total crs te and vrs te depicts that overall technical efficiency is not achieved since output is required to be increased by 18.2 percent when constant returns to scale is assumed and 11.3 percent when variable returns to scale is assumed in the year 2017-18.

Table 4.14: Malmquist Distance Summary for 2018-19				
Firm no.	crs te rel to tech in yr			vrs
	t-1	t	t+1	te
1	1.297	1.000	1.049	1.000
2	0.312	0.349	0.371	0.350
3	0.998	1.000	1.119	1.000
4	1.022	1.000	1.096	1.000
5	1.149	1.000	1.216	1.000
6	0.840	1.000	0.992	1.000
7	1.009	1.000	1.219	1.000
8	1.131	1.000	1.134	1.000
9	1.015	1.000	1.067	1.000
10	0.451	0.453	0.457	0.794
11	1.147	1.000	0.888	1.000
Mean	0.943	0.891	0.964	0.922

Source: Own Calculation

The above table, i.e., table 4.14 shows output-oriented Malmquist Distance Summary for the year 2018-19. Firm no. 2 and 10 are technically inefficient when CRS (crs te) is assumed or they need to increase their output by 65.1 and 54.7 percent respectively to become technically efficient in the year 2018-19. Also, when VRS technical efficiency (vrs te) is assumed, only Firm 2 and 10 are technically inefficient but shows an increasing returns to scale–since vrs te is higher than crs te–where they need to increase their output by 65 and 20.6 percent respectively in 2018-19. The rest of the DMUs or firms are technically efficient in both crs te and vrs te. All DMUs exhibit an increasing returns to scale in the year 2018-19. However, the total crs te and vrs te depicts that overall technical efficiency is not achieved since output is required to be increased by 10.9 percent when constant returns to scale is assumed and 7.8 percent when variable returns to scale is assumed in the year 2018-19.

Table 4.15: Malmquist Distance Summary for 2019-20				
Firm no.	crs te rel to tech in yr			vrs te
	t-1	t	t+1	
1	1.140	1.000	1.532	1.000
2	0.447	0.442	0.584	0.489
3	1.104	1.000	1.416	1.000
4	1.010	0.973	0.934	0.989
5	1.003	1.000	1.545	1.000
6	1.199	1.000	1.350	1.000
7	0.999	1.000	1.227	1.000
8	1.166	1.000	1.416	1.000
9	1.040	1.000	1.215	1.000
10	0.445	0.466	0.469	0.501
11	2.937	1.000	4.513	1.000
Mean	1.135	0.896	1.473	0.907

Source: Own Calculation

The above table, i.e., table 4.15 shows output-oriented Malmquist Distance Summary for the year 2019-20. Firm no. 2, 4 and 10 are technically inefficient when CRS (crs te) is assumed or they need to increase their output by 55.8, 2.7 and 53.4 percent respectively to become technically efficient in the year 2019-20. Also, when VRS technical efficiency (vrs te) is assumed, only Firm 2, 4 and 10 are technically inefficient but shows an increasing returns to scale–since vrs te is higher than crs te–where they need to increase their output by 51.1, 1.1 and 49.9 percent respectively in 2019-20. The rest of the DMUs or firms are technically efficient in both crs te and vrs te. All DMUs exhibit an increasing returns to scale in the year 2019-20. However, the total crs te and vrs te depicts that overall technical efficiency is not achieved since output is required to be increased by 10.4 percent when constant returns to scale is assumed and 9.3 percent when variable returns to scale is assumed in the year 2019-20.

Table 4.16: Malmquist Distance Summary for 2020-21				
Firm no.	crs te rel to tech in yr			vrs te
	t-1	t	t+1	
1	0.847	1.000	0.000	1.000
2	0.529	0.820	0.000	0.820
3	0.778	1.000	0.000	1.000
4	1.371	1.000	0.000	1.000
5	0.828	1.000	0.000	1.000
6	1.260	1.000	0.000	1.000
7	1.004	1.000	0.000	1.000
8	0.735	0.793	0.000	1.000
9	0.931	1.000	0.000	1.000
10	0.179	0.230	0.000	0.449
11	0.367	0.987	0.000	1.000
Mean	0.803	0.894	0.000	0.934

Source: Own Calculation

The above table, i.e., table 4.16 shows output-oriented Malmquist Distance Summary for the year 2020-21. Firm no. 2, 8, 10 and 11 are technically inefficient when CRS (crs te) is assumed or they need to increase their output by 18, 20.7, 77 and 1.3 percent respectively to become technically efficient in the year 2020-21. However, when VRS technical efficiency (vrs te) is assumed, only Firm 2 and 10 are technically inefficient but shows a constant (Firm no. 2) and increasing returns to scale (Firm no. 10)–since vrs te is higher than crs te–where they need to increase their output by 18 and 55.1 percent respectively in 2020-21. The rest of the DMUs or firms are technically efficient in both crs te and vrs te. All DMUs except Frim no. 2 exhibit an increasing returns to scale in the year 2019-20. However, the total crs te and vrs te depicts that overall technical efficiency is not achieved since output is required to be increased by 10.6 percent when constant returns to scale is assumed and 6.6 percent when variable returns to scale is assumed in the year 2020-21.

Table 4.17: Malmquist Index Summary for 2017-18					
Firm no.	**effch**	**techch**	**pech**	**sech**	**tfpch**
1	1.000	0.975	1.000	1.000	0.975
2	0.745	1.309	0.842	0.884	0.975
3	0.901	1.169	1.000	0.901	1.053
4	0.959	1.196	0.983	0.976	1.147
5	1.000	1.135	1.000	1.000	1.135
6	1.000	1.433	1.000	1.000	1.433
7	1.000	1.123	1.000	1.000	1.123
8	1.000	0.956	1.000	1.000	0.956
9	1.016	1.306	0.949	1.070	1.372
10	1.112	1.066	1.726	0.644	1.185
11	0.711	1.190	0.818	0.870	0.846
Mean	0.942	1.161	1.009	0.933	1.093

Source: Own Calculation

The above table, i.e., table 4.17 shows output-oriented Malmquist Index Summary for the year 2017-18. Firm no. 1, 2, 8 and 11 show a decline in total factor productivity (tfpch) with 0.975, 0.975, 0.956 and 0.846 respectively due to a decline in some of the variables considered such as changes in efficiency (effch), technical efficiency (techch), pure efficiency (pech) and scale efficiency (sech), the firms need to increase their output by 2.5, 2.5, 4.4 and 15.4 percent respectively to achieve a total factor productivity of 1 in 2017-18. On the other hand, all other DMUs or firms (3, 4, 5, 6, 7, 9 and 10) exhibit an increase in total factor productivity with 1.053, 1.147, 1.135, 1.433, 1.123, 1.372 and 1.185 respectively due to the changes in the variable considered in 2017-18. Overall, there is an increase in total factor productivity in 2017-18 with 1.093 tfpch or an increase of 9.3 percent out of which; firm no. 11 has the lowest tfpch with 0.846 or a decline in total factor productivity of 15.4 percent mainly due to a decrease in efficiency (effch), pure efficiency (pech) and scale efficiency (sech); on the other hand, firm no. 6 has the highest tfpch with 1.433 or an increase

in total factor productivity by 43.3 percent mainly due to an increase in technical efficiency (techch).

Table 4.18: Malmquist Index Summary for 2018-19					
Firm no.	**effch**	**techch**	**pech**	**sech**	**tfpch**
1	1.000	1.042	1.000	1.000	1.042
2	1.558	0.850	1.373	1.134	1.325
3	1.118	0.923	1.000	1.118	1.032
4	1.085	1.002	1.058	1.026	1.087
5	1.000	0.995	1.000	1.000	0.995
6	1.000	0.510	1.000	1.000	0.510
7	1.000	0.815	1.000	1.000	0.815
8	1.000	1.061	1.000	1.000	1.061
9	1.123	0.959	1.053	1.066	1.077
10	0.848	0.996	0.902	0.940	0.844
11	1.864	1.043	1.376	1.358	1.948
Mean	1.117	0.911	1.060	1.053	1.017

Source: Own Calculation

The above table, i.e., table 4.18 shows output-oriented Malmquist Index Summary for the year 2018-19. Firm no. 5, 6, 7 and 10 show a decline in total factor productivity (tfpch) with 0.995, 0.510, 0.815 and 0.844 respectively due to a decline in some of the variables considered such as changes in efficiency (effch), technical efficiency (techch), pure efficiency (pech) and scale efficiency (sech), the firms need to increase their output by 0.5, 49, 18.5 and 15.6 percent respectively to achieve a total factor productivity of 1 in 2018-19. On the other hand, all other DMUs or firms (1, 2, 3, 4, 8, 9 and 11) exhibit an increase in total factor productivity with 1.042, 1.325, 1.032, 1.087, 1.061, 1.077 and 1.948 respectively due to the changes in the variable considered in 2018-19. Overall, there is an increase in total factor productivity in 2018-19 with 1.017 tfpch or an increase of 1.7 percent out of which; firm no. 6 has the lowest tfpch with 0.510 or a decline in total factor productivity of 49 percent mainly due to a decrease in technical efficiency (techch); on the other hand, firm no. 11 has

the highest tfpch with 1.948 or an increase in total factor productivity by 94.8 percent due to an increase in efficiency (effch), technical efficiency (techch), pure efficiency (pech) and scale efficiency (sech).

Table 4.19: Malmquist Index Summary for 2019-20

Firm no.	effch	techch	pech	sech	tfpch
1	1.000	1.042	1.000	1.000	1.042
2	1.264	0.977	1.400	0.903	1.235
3	1.000	0.993	1.000	1.000	0.993
4	0.973	0.973	0.989	0.984	0.947
5	1.000	0.908	1.000	1.000	0.908
6	1.000	1.100	1.000	1.000	1.100
7	1.000	0.905	1.000	1.000	0.905
8	1.000	1.014	1.000	1.000	1.014
9	1.000	0.987	1.000	1.000	0.987
10	0.984	0.994	0.630	1.560	0.978
11	1.000	1.819	1.000	1.000	1.819
Mean	1.018	1.044	0.988	1.030	1.062

Source: Own Calculation

The above table, i.e., table 4.19 shows output-oriented Malmquist Index Summary for the year 2019-20. Firm no. 3, 4, 5, 7, 9 and 10 show a decline in total factor productivity (tfpch) with 0.993, 0.947, 0.908, 0.905, 0.987 and 0.978 respectively due to a decline in some of the variables considered such as changes in efficiency (effch), technical efficiency (techch), pure efficiency (pech) and scale efficiency (sech), the firms need to increase their output by 0.7, 5.3, 9.2, 9.5, 1.3 and 2.2 percent respectively to achieve a total factor productivity of 1 in 2019-20. On the other hand, other DMUs or firms (1, 2, 6, 8 and 11) exhibit an increase in total factor productivity with 1.042, 1.235, 1.100, 1.014 and 1.819 respectively due to the changes in the variable considered in 2019-20. Overall, there is an increase in total factor productivity in 2019-20 with 1.062 tfpch or an increase of 6.2 percent out of which; firm no. 7 has the lowest tfpch with 0.905 or a decline in total factor

productivity of 9.5 percent mainly due to a decrease in technical efficiency (techch); on the other hand, firm no. 11 has the highest tfpch with 1.819 or an increase in total factor productivity by 81.9 percent due to an increase technical efficiency (techch).

Table 4.20: Malmquist Index Summary for 2020-21

Firm no.	effch	techch	pech	sech	tfpch
1	1.000	0.743	1.000	1.000	0.743
2	1.857	0.699	1.676	1.108	1.297
3	1.000	0.741	1.000	1.000	0.741
4	1.027	1.195	1.011	1.016	1.228
5	1.000	0.732	1.000	1.000	0.732
6	1.000	0.966	1.000	1.000	0.966
7	1.000	0.905	1.000	1.000	0.905
8	0.793	0.809	1.000	0.793	0.642
9	1.000	0.875	1.000	1.000	0.875
10	0.515	0.860	0.897	0.574	0.443
11	0.987	0.287	1.000	0.987	0.283
Mean	0.976	0.764	1.039	0.940	0.746

Source: Own Calculation

The above table, i.e., table 4.20 shows output-oriented Malmquist Index Summary for the year 2020-21. Firm no. 1, 3, 5, 6, 7, 8, 9, 10 and 11 show a decline in total factor productivity (tfpch) with 0.743, 0.741, 0.732, 0.966, 0.905, 0.642, 0.875, 0.443 and 0.283 respectively due to a decline in some of the variables considered such as changes in efficiency (effch), technical efficiency (techch), pure efficiency (pech) and scale efficiency (sech), the firms need to increase their output by 25.7, 25.9, 26.8, 3.4, 9.5, 35.8, 12.5, 56.7 and 71.7 percent respectively to achieve a total factor productivity of 1 in 2020-21. On the other hand, few other DMUs or firms (2 and 4) exhibit an increase in total factor productivity with 1.297 and 1.228 respectively due to the changes in the variable considered in 2020-21. Overall, there is a decline in total factor productivity in 2020-21 with 0.746 tfpch or a decrease of 25.4 percent out of which; firm no. 11 has the lowest tfpch with 0.283 or a decline in total factor

productivity of 71.7 percent mainly due to a decrease in efficiency (effch), technical efficiency (techch) and scale efficiency (sech); on the other hand, firm no. 2 has the highest tfpch with 1.297 or an increase in total factor productivity by 29.7 percent due to an increase in efficiency (effch), pure efficiency (pech) and scale efficiency (sech).

Table 4.21: Malmquist Index Summary of Annaul Means 2017-18 to 2020-21

Year	effch	techch	pech	sech	tfpch
2017-18	0.942	1.161	1.009	0.933	1.093
2018-19	1.117	0.911	1.060	1.053	1.017
2019-20	1.018	1.044	0.988	1.030	1.062
2020-21	0.976	0.764	1.039	0.940	0.746
Mean	1.011	0.958	1.024	0.988	0.969

Source: Own Calculation

The above table, i.e., table 4.21 shows output-oriented Malmquist Index Summary of Annual Means for the year 2017-18 to 2020-21. The mean efficiency change (effch) during 2017-21 is 1.011, i.e., there is an average increase in efficiency of 1.1 percent; out of which the highest increase in efficiency is in the year 2018-19 where effch increases by 11.7 percent while the lowest is in 2020-21 with a decrease in efficiency by 2.4 percent. The mean technical efficiency change (techch) during 2017-21 is 0.958, i.e., there is an average decrease in technical efficiency of 4.2 percent; out of which the highest increase in technical efficiency is in the year 2017-18 where techch increases by 1.61 percent while the lowest in 2020-21 with a decrease in technical efficiency by 23.6 percent. The mean pure efficiency change (pech) during 2017-21 is 1.024, i.e., there is an average increase in pure efficiency of 2.4 percent; where the highest increase in pure efficiency is in the year 2020-21 where pech increases by 3.9 percent while the lowest is in 2019-20 with a decline in pure efficiency by 1.2 percent. The mean scale efficiency change (sech) during 2017-21 is 0.988, i.e., there is an average decrease in scale efficiency of 1.2 percent; where the highest increase in scale efficiency is in the year 2018-19 where sech increases by 5.3 percent while the lowest is in 2017-18 with a decline in scale efficiency by 6.7 percent.

The mean total factor productivity change (tfpch) during 2017-21 is 0.969, i.e., there is an average decrease in total factor productivity of 3.1 percent; where the highest increase in total factor productivity is in the year 2017-18 where tfpch increases by 9.3 percent while the lowest is in 2020-21 with a decline in total factor productivity by 25.4 percent.

Table 4.22: Malmquist Index Summary of Firm Means 2017-21

Firm no.	effch	techch	pech	sech	tfpch
1	1.000	0.942	1.000	1.000	0.942
2	1.285	0.933	1.283	1.001	1.199
3	1.002	0.944	1.000	1.002	0.946
4	1.010	1.086	1.010	1.000	1.097
5	1.000	0.931	1.000	1.000	0.931
6	1.000	0.938	1.000	1.000	0.938
7	1.000	0.931	1.000	1.000	0.931
8	0.944	0.955	1.000	0.944	0.901
9	1.034	1.020	1.000	1.034	1.054
10	0.831	0.976	0.968	0.858	0.811
11	1.070	0.897	1.030	1.039	0.960
Mean	1.011	0.958	1.024	0.988	0.969

Source: Own Calculation

The above table, i.e., table 4.22 shows output-oriented Malmquist Index Summary of Firm Means for the year 2017-18 to 2020-21. The mean efficiency change (effch) during 2017-21 is 1.011, i.e., there is an average increase in efficiency of 1.1 percent; out of which the highest increase in efficiency is in firm no. 2 where effch increases by 28.5 percent while the lowest is firm no. 10 with a decrease in efficiency by 16.9 percent. The mean technical efficiency change (techch) during 2017-21 is 0.958, i.e., there is an average decrease in technical efficiency of 4.2 percent; out of which the firm with the highest increase in technical efficiency is firm no. 4 where techch increases by 8.6 percent while the lowest is firm no. 11 with a decrease in technical efficiency by 10.3 percent. The mean pure efficiency change (pech) during 2017-21 is 1.024, i.e., there is an average increase in pure efficiency of 2.4 percent; in which the highest increase in pure efficiency accrues to firm no. 2 where pech

increases by 28.3 percent while the lowest is firm no. 10 with a decline in pure efficiency by 3.2 percent. The mean scale efficiency change (sech) during 2017-21 is 0.988, i.e., there is an average decrease in scale efficiency of 1.2 percent; in which the highest increase in scale efficiency is found in firm no. 11 where sech increases by 3.9 percent while the lowest is firm no. 10 with a decline in scale efficiency by 14.2 percent.

The mean total factor productivity change (tfpch) during 2017-21 is 0.969, i.e., there is an average decrease in total factor productivity of 3.1 percent; in which the highest increase in total factor productivity among the firms is firm no. 2 where tfpch increases by 19.9 percent while the lowest is firm no. 10 with a decline in total factor productivity by 18.9 percent. DMUs or firms that shows an average decline in total factor productivity during 2017-21 are firm no. 1, 3, 5, 6, 7, 8, 10 and 11. Firm no. 1 due to decrease in technical efficiency change (0.942); firm no. 3 due to technical efficiency change (0.944); firm no. 5 due to technical efficiency change (0.931); firm no. 6 due to technical efficiency change (0.938); firm no. 7 due to technical efficiency change (0.931); firm no. 8 due to efficiency change (0.944), technical efficiency change (0.955) and scale efficiency change (0.944); firm no. 10 due to efficiency change (0.831), technical efficiency change (0.976), pure efficiency change (0.968) and scale efficiency change (0.858); and firm no. 11 due to technical efficiency change (0.897).

On the other hand, DMUs or firms that shows an average increase in total factor productivity during 2017-21 are firm no. 2, 4 and 9. Firm no. 2 due to increase in efficiency change (1.285), pure efficiency change (1.283) and scale efficiency change (1.001); firm no. 4 due to efficiency change (1.010), technical efficiency change (1.086) and pure efficiency change (1.010); firm no. 9 due to efficiency change (1.034), technical efficiency change (1.020) and scale efficiency change (1.034).

CHAPTER V

ANALYSIS OF SOCIO-ECONOMIC, SERVICE QUALITY AND PATIENTS' SATISFACTION

5.1: INTRODUCTION

This chapter mainly entails data analysis and interpretation that have been done through filed survey. The preceding chapter mainly highlights the institutional provision, economic welfare provision, productivity and efficiency analysis of various Public Hospitals in Mizoram as well as a brief comparison of Public and Private hospitals in Mizoram at large. This chapter delves deeper into various aspects of patients' status and perception of various Public Hospitals across Mizoram. In order to have convincing findings and strong arguments regarding the objectives and research questions of this research, a field survey has been conducted by employing an interview schedule.

This chapter is broadly divided into four sections. The first section deals with the demographic and socio-economic profile of the respondents and is labeled as Section-A; the second section inquires about the service quality–based on SERVQUAL model–of various Public Hospital establishments across Mizoram and is labeled as Section-B; the third section briefly highlights the extent of inequality among the beneficiaries of Public Hospitals' services and is labelled as Section-C; the last section. i.e., Section-D argues about the validity of certain thought-provoking hypotheses, where many variables are tested whether or not there is inter-dependence between the studied variables. All the analyses of this chapter are based on primary observation, the methods of collection of data, the total number of respondents as well as the area being covered is highlighted in Chapter I.

5.2: SECTION-A: DEMOGRAPHIC AND SOCIO-ECONOMIC PROFILE

In order to understand the economic status of the respondents, an inquiry of the demographic and socio-economic conditions of patients is a prerequisite to elicit insightful information that have strong implications with regard to the current status of healthcare provision in Mizoram.

The following tables and graphs highlight the demographic and socio-economic profile of the respondents:

Table 5.1: Demographic Profile of Respondents			
Background Variables		**Total respondents**	**Percentage**
Gender	Male	194	46.2
	Female	226	53.8
	Total	**420**	**100**
Age	Below 18	40	9.5
	19-40	197	46.9
	41-60	129	30.7
	Above 60	54	12.9
	Total	**420**	**100**
Education	Illiterate	35	8.3
	Elementary	94	22.4
	High School/Diploma	190	45.2
	Graduate & Above	101	24.0
	Total	**420**	**100**

Source: Field Survey, 2022

The above table, i.e., table 5.1 shows that there are 194 males and 226 female respondents. Male constitutes 46.2 percent and Female 53.8 respectively. The age distribution shows that there are 40 respondents below the age of 18 or 9.5 percent; 197 respondents between the age of 19 and 40 which constitute 46.9 percent of the total respondents; 129 respondents of 41-60 age group with 30.7 percent out of the total respondents and 54 respondents above 60 with 12.9 percent.

In terms of educational qualification, there are 35 respondents who are illiterate with 8.3 percent; 94 respondents who have elementary level of education with 22.4 percent; 190 respondents acquire high school or its equivalent diploma with 45.2 percent; and there are 101 or 24.0 percent who acquire bachelor's degree or above with regard to educational attainment.

Table 5.2: Geographical Profile of Respondents			
Background Variables		**Total respondents**	**Percentage**
Residential Area	City Area	174	41.4
	District Capital	106	25.2
	RD Block Towns	40	9.5
	Village	100	23.8
	Total	**420**	**100**
District	Mamit	12	2.9
	Kolasib	29	6.9
	Aizawl	243	57.9
	Serchhip	25	6.0
	Champhai	18	4.3
	Lunglei	61	14.5
	Siaha	17	4.0
	Lawngtlai	15	3.6
	Total	**420**	**100**

Source: Field Survey, 2022

The above table, i.e., table 5.2 highlights the geographical profile or dimension of the respondents. In terms of residential area, there are 174 or 41.2 percent who live in city area; 106 or 25.2 percent in district capitals; 40 or 9.5 percent in RD block towns; and 100 or 23.8 percent in villages. City Area has the highest number of respondents in terms of residential area followed by district capital, village and RD block towns.

In terms of zonal or district-wise classification, there are 12 or 2.9 percent from Mamit district; 29 or 6.9 percent from Kolasib district; 243 or 57.9 percent from Aizawl district; 25 or 6.0 percent from Serchhip district; 18 or 4.3 percent from Champhai district; 61 or 14.5 from Lunglei district; 17 or 4.0 percent from Siaha district; and 15 or 3.6 percent from Lawngtlai district.

Table 5.3: Socio-Economic Profile of Respondents			
Background Variables		**Total respondents**	**Percentage**
Occupation	Dependent	72	17.1
	Unemployed	67	16.0
	Agricultural Worker	51	12.1
	Daily Wage Earner	76	18.1
	Corporate Employee	25	6.0
	Govt. Employee	55	13.1
	Self Employed	74	17.6
	Total	**420**	**100**
Poverty Status	AAY	58	13.8
	BPL	146	34.8
	APL	216	51.4
	Total	**420**	**100**
Housing Type	Kutcha	94	22.4
	Semi-Pucca	150	35.7
	Pucca	176	41.9
	Total	**420**	**100**
Income	Below 10000	78	18.6
	10000-50000	253	60.2
	50000-100000	76	18.1
	Above 100000	13	3.1
	Total	**420**	**100**

Source: Field Survey, 2022

The above table, i.e., table 5.3 highlights the socio-economic profile of the respondents. There are four dimensions, viz., Occupation, Poverty Status, Housing Type and Income with each dimension having their own sub-categories.

In terms of Occupation, there are 72 or 17.1 percent who are dependent; 67 or 16.0 percent who are unemployed; 51 or 12.1 percent who are agricultural workers; 76 or 18.1 percent who are daily wage earners; 25 or 6.0 percent who are corporate employee; 55 or 13.1 percent who are government employee; and 74 or 17.6 percent who are self-employed.

The poverty status of the respondents shows that there are 58 or 13.8 percent who falls under AAY category; 146 or 34.8 percent in BPL category; and 216 or 51.4 percent in APL category. In terms of living conditions, there are 94 or 22.4 percent living in kutcha houses; 150 or 35.7 percent in semi-pucca houses; and 176 or 41.9 percent in pucca houses.

Finally, the monthly income distribution shows that there are 78 or 18.6 percent below ₹10,000; 253 or 60.2 percent between ₹10,000-₹50,000; 76 or 18.1 percent between ₹50,000-₹100,000; and 13 or 3.1 Above ₹100,000.

Table 5.4: Healthcare Indicators of Respondents

Background Variables		Total respondents	Percentage
Disease Type	Chronic	150	35.7
	Viral Infection	70	16.7
	Critical Illness	113	26.9
	Delivery & Child Health	29	6.9
	Accidental	58	13.8
	Total	**420**	**100**
Expenditure on Healthcare	Below 10000	160	38.1
	10000-30000	112	26.7
	30000-50000	67	16.0
	Above 50000	81	19.3
	Total	**420**	**100**
Post-hospitalization Spending	Below 1000	74	17.6
	1000-5000	115	27.4
	5000-10000	93	22.1
	Above 10000	138	32.9
	Total	**420**	**100**

Source: Field Survey, 2022

The above table, i.e., table 5.4 shows various dimensions of healthcare indicators of the respondents. With regard to disease type, there are 150 respondents or 35.7 percent under chronic illness; 70 or 16.7 percent under viral infection; 113 or 26.9 percent under critical illness; 29 or 6.9 percent under delivery and child health; and 58 or 13.8 percent under accidental category.

In terms of annual expenditure on healthcare, there are 160 respondents or 38.1 percent whose annual expenditure falls below ₹10,000; 112 or 26.7 percent between ₹10,000-₹30,000; 67 or 16.0 percent between ₹30,000-₹50,000; and 81 or 19.3 percent whose annual expenditure on healthcare is above ₹50,000.

5.2.1: Some inter-relationship among the various indicators of demographic and socio-economic profile

In this sub-section, various dimensions of demographic and socio-economic indicators are analyzed to show the extent of their inter-relationship with other indicators. The following tables highlight such inter-relationship:

Table 5.5: Poverty Status and Expenditure on Healthcare

Poverty Status	Expenditure on Healthcare				Total
	Below 10000	10000-30000	30000-50000	Above 50000	
AAY	30	23	4	1	**58**
BPL	56	29	23	38	**146**
APL	74	60	40	42	**216**
Total	**160**	**112**	**67**	**81**	**420**

Source: Field Survey, 2022

The above table, i.e., table 5.5 shows the relationship between poverty status and expenditure on healthcare. It can be seen that families whose poverty status is in line with AAY category has relatively lower expenditure on healthcare as compared to BPL or AAY families such that only 1 family has had a healthcare expenditure above ₹50,000. Altogether, it can be seen that despite the relative difference in expenditure on healthcare based on poverty status, most of the respondents in all the three categories have an average expenditure on healthcare below ₹10,000 with 160 family count.

Among the BPL family there are 38 families whose annual healthcare expenditure is above ₹50,000 which is relatively the highest among the three poverty status categories.

Table 5.6: Residential Area and Disease Type						
Residential Area	**Disease Type**					**Total**
	Chronic	Viral infections	Critical illness	Delivery & Child Health	Accidental	
City Area	66	26	48	13	21	**174**
District Capital	35	26	21	9	15	**106**
RD Block Town	11	8	14	2	5	**40**
Village	38	10	30	5	17	**100**
Total	**150**	**70**	**113**	**29**	**58**	**420**

Source: Field Survey, 2022

The above table. i.e., table 5.6 shows the relationship between residential area and disease type of the respondents. In city area, district capitals and villages, chronic illness is the most common type of disease with 66, 35 and 38 respondents out of 174, 106 and 100 total respondents respectively. In RD block towns, the most prevalent disease type is critical illness with 14 respondents out of 40 total respondents.

Also, chronic illness has the highest disease type across all types of residential area with 150 respondents falling under this category out of 420 total respondents; followed by critical illness, viral infections, accidental and delivery and child health with 113, 70, 58 and 29 respondents respectively.

Table 5.7: Gender and Disease Type						
Gender	**Disease Type**					**Total**
	Chronic	Viral infections	Critical illness	Delivery & Child Health	Accidental	
Male	66	33	56	4	35	**194**
Female	84	37	57	25	23	**226**
Total	**150**	**70**	**113**	**29**	**58**	**420**

Source: Field Survey, 2022

The above table. i.e., table 5.7 shows the relationship between gender and disease type of the respondents. Among the male respondents, the most prevalent disease type is chronic illness with 66 respondents out of 194 total respondents followed by critical

illness, accidental, viral infections and delivery and child health with 56, 35, 33 and 4 respectively. Also, among the female respondents, the most prevalent disease type is chronic illness with 84 respondents out of 226 total respondents followed by critical illness, viral infections, delivery and child health and accidental with 57, 37, 25 and 23 respectively.

Moreover, chronic illness has the highest respondents in both gender with 150 respondents out of 420 total respondents followed by critical illness, viral infections, accidental and delivery and child health with 113, 70, 58 and 29 respondents respectively.

Table 5.8: Poverty Status and Residential Area

Poverty Status	**Residential Area**				**Total**
	City Area	District Capital	RD Block Town	Village	
AAY	32	12	8	6	**58**
BPL	48	26	11	61	**146**
APL	94	68	21	33	**216**
Total	**174**	**106**	**40**	**100**	**420**

Source: Field Survey, 2022

The above table, i.e., table 5.8 shows the relationship between poverty status and residential area dimensions of the respondents. It can be seen that among the AAY category city area has the highest count with 32 families followed by district capital, RD block town and villages with 12, 8 and 6 respectively. In BPL category, village category has the highest count with 61 families followed by city area, district capital and RD block towns with 48, 26 and 11 families respectively. In APL category, city area has the highest count with 94 families followed by district capital, village and RD block town with 68, 33 and 21 families respectively.

Moreover, APL has the highest count with 216 families out of 420 across all categories of residential area followed by BPL and AAY with 146 and 58 respectively. Also, in city area, district capital and RD block town, the highest is APL category with 94, 68 and 21 out of 320 total families. On the other hand, in village category in terms of residential area, the highest count with regard to poverty status is BPL with 61 out of 100 total families.

Table 5.9: Housing Type and Residential Area					
Housing Type	**Redisdential Area**				**Total**
	City Area	District Capital	RD Block Town	Village	
Kutcha	33	24	9	28	**94**
Semi-pucca	62	26	20	42	**150**
Pucca	79	56	11	30	**176**
Total	**174**	**106**	**40**	**100**	**420**

Source: Field Survey, 2022

The above table, i.e., table 5.9 shows the relationship between residential area and housing type dimensions of the respondents. In city area and district capital, pucca houses have the highest count with 79 and 56 out of 174 and 106 families respectively. On the other hand, in village and RD block town, semi-pucca houses have the highest count with 20 and 42 out of 40 and 100 families respectively.

In terms of the total number of housing type across all residential areas, pucca houses has the highest count with 176 followed by semi-pucca and kutcha houses with 150 and 94 respectively out of a total of 420 respondents. In city area, pucca houses is the most common type of housing with 79 followed by semi-pucca and kutcha houses with 62 and 33 respectively out of a total of 174 respondents.

Also, in district capital, pucca houses is the most common type of housing with 56 followed by semi-pucca and kutcha houses with 26 and 24 respectively out of a total of 106 respondents. However, in RD town, semi-pucca has the highest count with 20 followed by pucca and kutcha housing type with 11 and 9 respectively out of a total of 40 respondents. Similarly, villages have semi-pucca as the typical housing type with 42 followed by pucca and kutcha housing with 30 and 28 respectively out of a total of 100 respondents.

5.3: SECTION-B: MEASUREMENT OF SERVICE QUALITY

To measure the quality of service (Buttle, 1997), the method used by Parasuraman et al., (1994) is used unchanged as widely used by several researchers. Despite being criticized by others to some extent, the method of evaluating service quality by Parasuraman is still used extensively.

Service quality is defined as the gap between a customer's expectation of a service and the perception of the service experience felt by the customer (Zeithaml and Berry, 1988). Gap score are obtained directly by analyzing the gap between the perception and expectation of the customers.

Table 5.10: SERVQUAL Dimension-wise Score

Dimensions	***Perception Mean Gap Score***	***Expectation Mean Gap Score***	***Overall Mean Gap Score***
Tangibles	5.010	5.985	-0.975
Reliability	4.934	5.850	-0.916
Assurance	4.973	5.835	-0.862
Responsiveness	4.881	5.594	-0.713
Empathy	4.752	5.455	-0.703

Source: Field Survey, 2022

The above table, i.e., table 5.10 shows the SERVQUAL overall dimension-wise score of the respondents. The mean gap score is calculated by subtracting the mean expectation score from the mean perception score. Empathy dimension has the lowest negative service quality mean gap with a score of -0.703 followed by Responsiveness dimension with a gap score of -0.713, Assurance dimension with -0.862, Reliability dimension with -0.916 and Tangibles dimension with -0.975 respectively. Tangibles has the highest negative score and Empathy vice versa. The overall negative mean gap score in the five dimensions is -0.834.

Table 5.11: Analysis of Tangible SERVQUAL Dimension				
Sl. No.	***Questions***	***Perception***	***Expectation***	***Gap Score***
Q1.	The Hospital has modern-looking, quality equipment.	4.964	6.104	-1.140
Q2.	The infrastructures at the hospital are visually appealing.	4.871	6.071	-1.200
Q3.	Employees of the hospital are neat-appearing	5.102	5.923	-0.821
Q4.	Materials associated with the services (such as pamphlet, sign/notice board etc.) are visually appealing.	5.102	5.840	-0.738
	Overall Mean	5.010	5.985	-0.975

Source: Field Survey, 2022

The above table, i.e., table 5.11 shows an in-depth analysis of Tangibles dimension shows that there are no positive gap scores. This implies that patients or healthcare beneficiaries rated all the expectation questions of the tangibles dimension for the hospital higher than their perception. The lowest negative mean gap score is Q4 with -0.738 which relates to visual appearance of the hospital associated with services such as beds, notice boards, rooms, corridors, pamphlets, statements, bills, etc. The second lowest negative mean gap score is Q3 “Employees of the hospital are neat appearing” with -0.821. The third lowest negative mean gap score is Q1 “The Hospital has modern-looking, quality equipment” with -1.140. Finally, the highest negative mean gap score is Q2 “The infrastructures at the hospital are visually appealing” with -1.200.

In the analysis of the tangibles dimension, the expectation of the customers barely overlaps their perception with a negative overall mean gap score of -0.975 which is barely below a one-point scale. This reveals that a slight improvement in terms of tangibles dimension with regard to providing healthcare services can positively influence patients’ perception and satisfaction.

Table 5.12: Analysis of Reliability SERVQUAL Dimension				
Sl. No.	***Questions***	***Perception***	***Expectation***	***Gap Score***
Q5.	When the hospital promises to do something by a certain time, they do so.	4.861	5.873	-1.012
Q6.	When patients have problem, the employees show sincere interest in solving it.	4.992	5.871	-0.879
Q7.	The hospital performs the service right the first time.	4.930	5.878	-0.948
Q8.	The hospital provides their services at the time they promise to do so.	4.866	5.861	-0.995
Q9.	The hospital insists on error free records.	5.021	5.766	-0.745
	Overall Mean	4.934	5.850	-0.916

Source: Field Survey, 2022

The above table, i.e., table 5.12 shows an inquiry into Reliability dimension shows that there are no positive gap scores. This implies that patients or healthcare beneficiaries rated all the expectation questions of the reliability dimension for the hospital higher than their perception. The lowest negative mean gap score is Q5 with -0.745 which relates to the hospitals' acumen on striving for error free records. The second lowest negative mean gap score is Q6 "When patients have problem, the employees show sincere interest in solving it" with -0.879. The third lowest negative mean gap score is Q7 "The Hospital performs the service right the first time" with -0.948. The fourth lowest negative mean gap score is Q8 "The hospital provides their services at the time they promise to do so" with -0.995. Finally, the highest negative mean gap score is Q5 "When the hospital promises to do something by a certain time, they do so" with -1.012.

With regard to reliability dimension, the expectation of the customers barely overlaps their perception with a negative overall mean gap score of -0.916 which entails that a slight improvement in terms of reliability dimension with regard to the provision of healthcare services can have a positive impact on patients' perception and satisfaction.

Table 5.13: Analysis of Assurance SERVQUAL Dimension				
Sl. No.	***Questions***	***Perception***	***Expectation***	***Gap Score***
Q10.	Employees of the hospital inform the patients exactly when services will be performed.	4.978	5.826	-0.848
Q11.	Employees of the hospital deliver prompt services to patients.	4.995	5.819	-0.824
Q12.	Employees of the hospital are always willing to help patients.	5.026	5.838	-0.812
Q13.	Employees of the hospital are never too busy to respond to patient's requests.	4.892	5.859	-0.976
	Overall Mean	4.973	5.835	-0.862

Source: Field Survey, 2022

The above table, i.e., table 5.13 highlights an inquiry into Assurance dimension which shows that there are no positive gap scores. This implies that patients or healthcare beneficiaries rated all the expectation questions of the assurance dimension for the hospital higher than their perception. The lowest negative mean gap score is Q12 “Employees of the hospital are always willing to help patients” with -0.812. The second lowest negative mean gap score is Q11 “Employees of the hospital deliver prompt services to patients” with -0.824. The third lowest negative mean gap score is Q10 “Employees of the hospital inform patients exactly when services will be performed” with -0.848. Ultimately, the highest negative mean gap score is Q13 “Employees of the hospital are never too busy to respond to patient’s requests” with -0.976. All negative mean gap scores in assurance dimension are below one-point scale.

In assurance dimension, the expectation of the customers barely overlaps their perception with a negative overall mean gap score of -0.862. This entails that a slight improvement in terms of reliability dimension with regard to the provision of healthcare services, can lead to a positive consequence on patients’ perception as well as satisfaction.

Table 5.14: Analysis of Responsiveness SERVQUAL Dimension				
Sl. No.	***Questions***	***Perception***	***Expectation***	***Gap Score***
Q14.	The behaviour of employees of the hospital instill confidence in patients.	4.971	5.819	-0.848
Q15.	Patients in the hospital feel safe in their transactions.	5.071	5.790	-0.719
Q16.	Employees of the hospital are courteous (respectful) towards patients.	4.957	5.819	-0.862
Q17.	Employees of the hospital are knowledgeable to patients' queries.	5.033	5.838	-0.805
Q18.	The hospital gives patients individual attention.	4.373	4.707	-0.334
	Overall Mean	4.881	5.594	-0.713

Source: Field Survey, 2022

The above table, i.e., table 5.14 shows the analysis of responsiveness dimension in which there are no positive gap scores. This implies that patients or healthcare beneficiaries rated all the expectation questions of the responsiveness dimension for the hospital higher than their perception. The lowest negative mean gap score is Q18 “The hospital gives patients individual attention” with -0.334. The second lowest negative mean gap score is Q15 “Patients in the hospital feel safe in their transaction” with -0.719. The third lowest negative mean gap score is Q17 “Employees of the hospital are knowledgeable to patients’ queries” with -0.805. The fourth lowest negative mean gap score is Q14 “The behaviour of employees of the hospital instill confidence in patients” with -0.848. Ultimately, the highest negative mean gap score is Q16 “Employees of the hospital are courteous (respectful) towards patients” with -0.862.

In responsiveness dimension, there is barely any significant difference between expectation and perception of service quality provided by public hospitals, with a modicum overall negative mean gap score of -0.713. This implies that a slight improvement in terms of responsiveness dimension with regard to the provision of healthcare services, can have a positive outcome on patients’ perception and satisfaction.

Table 5.15: Analysis of Empathy SERVQUAL Dimension				
Sl. No.	***Questions***	***Perception***	***Expectation***	***Gap Score***
Q19.	The hospital has operating hours convenient to all their patients.	4.883	5.628	-0.745
Q20.	The hospital has employees who give patients personal attention.	4.359	4.911	-0.552
Q21.	The hospital has the patients' best interest at heart.	4.907	5.745	-0.838
Q22.	The employees of the hospital understand the specific needs of their patients.	4.859	5.538	-0.679
	Overall Mean	4.752	5.455	-0.703

Source: Field Survey, 2022

The above table, i.e., table 5.15 shows the analysis of empathy dimension in which there are no positive gap scores. This implies that patients or healthcare beneficiaries rated all the expectation questions of the empathy dimension for the hospital higher than their perception. The lowest negative mean gap score is Q20 “The hospital has employees who give patients personal attention” with -0.552. The second lowest negative mean gap score is Q22 “The employees of the hospital understand the specific need of their patients” with -0.679. The third lowest negative mean gap score is Q19 “The hospital has operating hours convenient to all their patients” with -0.745. Lastly, the highest negative mean gap score is Q21 “The hospital has the patients’ best interest at heart” with -0.838.

In empathy dimension, there is barely any significant difference between expectation and perception of service quality provided by public hospitals, with a little overall negative mean gap score of -0.703. This implies that a slight improvement in terms of empathy dimension with regard to the provision of healthcare services, can have a positive outcome on patients’ perception and satisfaction.

Table 5.16: Lowest Negative Gap Score in each Dimension				
Dimension	***Question no.***	***Perception***	***Expectation***	***Gap Score***
Tangible	Q4.	5.102	5.840	-0.738
Reliability	Q9.	5.021	5.766	-0.745
Assurance	Q12.	5.026	5.838	-0.812
Responsiveness	Q.18	4.373	4.707	-0.334
Empathy	Q20.	4.359	4.911	-0.552

Source: Field Survey, 2022

The above table, i.e., table 5.16 shows the lowest negative gap score in each SERVQUAL dimension. The lowest negative mean gap score of tangibles dimension is Q4 "Materials associated with the services (such as pamphlet, sign/notice board etc.) are visually appealing" with a score of -0.738.

The lowest negative mean gap score of reliability dimension is Q9 "The Hospital insists on error free records" with a score of -0.745. For assurance dimension, the lowest negative mean gap score is Q12 "Employees of the hospital are always willing to help patients" with a score of -0.812.

With regard to responsiveness dimension, the lowest negative mean gap score is Q18 "The Hospital gives patients individual attention" with a score of -0.334. Ultimately in empathy dimension, the lowest negative gap score is Q20 "The Hospital has employees who give patients personal attention" with a score of -0.552.

The lowest negative mean gap score among the five SERVQUAL dimensions is responsiveness with a score of -0.334.

Table 5.17: Highest Negative Gap Score in each Dimension				
Dimension	***Question no.***	***Perception***	***Expectation***	***Gap Score***
Tangible	Q2.	4.871	6.071	-1.200
Reliability	Q5.	4.861	5.873	-1.012
Assurance	Q13.	4.892	5.859	-0.976
Responsiveness	Q16.	4.957	5.819	-0.862
Empathy	Q21.	4.907	5.745	-0.838

Source: Field Survey, 2022

The above table, i.e., table 5.17 shows the highest negative gap score in each SERVQUAL dimension. The highest negative mean gap score of tangibles dimension is Q2 “The infrastructures of the hospital are visually appealing” with a score of -1.200.

The highest negative mean gap score of reliability dimension is Q5 “When the Hospital promises to do something by a certain time, they do so” with a score of -1.012. For assurance dimension, the highest negative mean gap score is Q13 “Employees of the hospital are never too busy to respond to patient’s requests” with a score of -0.976.

With regard to responsiveness dimension, the highest negative mean gap score is Q16 “Employees of the Hospital are courteous (respectful) towards patients” with a score of -0.862. Ultimately in empathy dimension, the highest negative mean gap score is Q21 “The Hospital has the patients’ best interest at heart” with a score of -0.838.

The highest negative mean gap score among the five SERVQUAL dimensions is tangibles with a score of -1.200.

5.3.1: Analysis of SERVQUAL Score Across Various Districts in Mizoram

In this sub-section, a district-wise analysis of SERVQUAL score is analyzed. The following tables highlights the SERVQUAL dimension scores across various districts in Mizoram:

Table 5.18: SERVQUAL Score in Various Districts of Mizoram

District	*Perception Mean Gap Score*	*Expectation Mean Gap Score*	*Overall Mean Gap Score*
Mamit	4.901	5.715	-0.814
Kolasib	4.605	5.503	-0.898
Aizawl	4.893	5.651	-0.758
Serchhip	4.891	6.197	-1.306
Champhai	5.340	6.666	-1.326
Lunglei	4.934	5.629	-0.695
Siaha	4.211	6.475	-2.264
Lawngtlai	5.993	6.396	-0.403

Source: Field Survey, 2022

The above table, i.e., table 5.18 shows SERVQUAL score in various districts of Mizoram. The lowest negative mean gap score is attained by District Hospital, Lawngtlai with a score of -0.403 followed by Civil Hospital, Lunglei; District Hospital, Kolasib; District Hospital, Mamit and Civil Hospital, Aizawl with a score of -0.695, -0.758, -0.814 and -0.898 respectively.

There are three districts with a negative SERVQUAL gap score of greater than -1, viz., District Hospital, Serchhip with a score of -1.306 followed by District Hospital, Champhai and District Hospital, Siaha with a score of -1.306 and -2.264 respectively. Among these three districts, District Hospital, Siaha has the highest negative mean gap score of -2.264.

Table 5.19: Tangible Score in Various Districts

District	*Perception Mean Gap Score*	*Expectation Mean Gap Score*	*Overall Mean Gap Score*
Mamit	4.812	5.770	-0.958
Kolasib	4.629	5.500	-0.871
Aizawl	4.905	5.947	-1.042
Serchhip	4.706	6.163	-1.457
Champhai	5.875	6.861	-0.986
Lunglei	4.844	5.770	-0.926
Siaha	5.617	6.779	-1.162
Lawngtlai	6.716	6.683	0.033

Source: Field Survey, 2022

The above table, i.e., table 5.19 shows Tangible dimension score in various districts of Mizoram. The highest mean gap score in Tangible is achieved by District Hospital, Lawngtlai with a score of 0.033 followed by District Hospital, Kolasib; Civil Hospital, Lunglei; District Hospital, Mamit and District Hospital, Champhai have a low negative score of -0.871, -0.926, -0.958, -0.986 respectively.

It can be seen that only District Hospital, Lawngtlai has a positive mean gap score in Tangible dimension across all other hospitals in various districts of Mizoram with a score of 0.033.

There are three districts with a negative Tangible gap score of greater than -1, viz., District Hospital, Serchhip with a score of -1.457 followed by District Hospital, Siaha and Civil Hospital, Aizawl with a score of -1.162 and -1.042 respectively. Among these three districts, District Hospital, Serchhip has the highest negative mean gap score of -1.457.

Table 5.20: Reliability Score in Various Districts

District	*Perception Mean Gap Score*	*Expectation Mean Gap Score*	*Overall Mean Gap Score*
Mamit	4.783	6.000	-1.217
Kolasib	4.558	5.517	-0.959
Aizawl	4.932	5.767	-0.835
Serchhip	4.965	6.208	-1.243
Champhai	5.133	6.800	-1.667
Lunglei	4.980	5.590	-0.610
Siaha	3.905	6.835	-2.930
Lawngtlai	6.573	6.653	-0.080

Source: Field Survey, 2022

The above table, i.e., table 5.20 shows Reliability dimension score in various districts of Mizoram. The lowest negative mean gap score in Reliability is achieved by District Hospital, Lawngtlai with a score of -0.080 followed by Civil Hospital, Lunglei; Civil Hospital, Aizawl; District Hospital, Kolasib with a score of -0.610, -0.835 and -0.959 respectively.

There are four districts with a negative Tangible gap score of greater than -1, viz., District Hospital, Siaha with a score of -2.930 followed by District Hospital, Champhai; District Hospital, Serchhip; and District Hospital, Mamit with a score of -1.667, -1.243 and -1.217 respectively.

Table 5.21: Assurance Score in Various Districts			
District	***Perception Mean Gap Score***	***Expectation Mean Gap Score***	***Overall Mean Gap Score***
Mamit	5.083	5.791	-0.708
Kolasib	4.560	5.482	-0.922
Aizawl	4.934	5.738	-0.804
Serchhip	4.945	6.231	-1.286
Champhai	5.291	6.847	-1.556
Lunglei	4.950	5.627	-0.677
Siaha	4.588	6.911	-2.323
Lawngtlai	6.516	6.700	-0.184

Source: Field Survey, 2022

The above table, i.e., table 5.21 shows Assurance dimension score in various districts of Mizoram. The lowest negative mean gap score in Assurance is achieved by District Hospital, Lawngtlai with a score of -0.184 followed by Civil Hospital, Lunglei; District Hospital, Mamit; Civil Hospital, Aizawl and District Hospital, Kolasib with a socre of -0.677, -0.708, -0.804, -0.922 respectively.

There are three districts with a negative Assurance gap score of greater than -1, viz., District Hospital, Siaha with a score of -2.232 followed by District Hospital, Champhai and District Hospital, Serchhip with a score of -1.556 and -1.286 respectively.

Table 5.22: Responsiveness Score in Various Districts			
District	***Perception Mean Gap Score***	***Expectation Mean Gap Score***	***Overall Mean Gap Score***
Mamit	5.033	5.566	-0.533
Kolasib	4.655	5.503	-0.848
Aizawl	4.870	5.435	-0.565
Serchhip	4.913	6.191	-1.278
Champhai	5.455	6.477	-1.022
Lunglei	4.94	5.632	-0.692
Siaha	3.870	6.517	-2.647
Lawngtlai	5.600	6.373	-0.773

Source: Field Survey, 2022

The above table, i.e., table 4.22 shows Responsiveness dimension score in various districts of Mizoram. The lowest negative mean gap score in Responsiveness is achieved by District Hospital, Mamit with a score of -0.533 followed by Civil Hospital, Aizawl; Civil Hospital, Lunglei; District Hospital, Lawngtlai and District Hospital, Kolasib with a score of -0.565, -0.692, -0.773, -0.848 respectively.

Meanwhile, there are three districts with a negative Responsiveness gap score of more than -1, viz., District Hospital, Siaha with a score of -2.647 followed by District Hospital, Serchhip and District Hospital, Champhai with a score of -1.278 and -1.022 respectively.

Table 5.23: Empathy Score in Various Districts

District	*Perception Mean Gap Score*	*Expectation Mean Gap Score*	*Overall Mean Gap Score*
Mamit	4.791	5.416	-0.625
Kolasib	4.620	5.508	-0.888
Aizawl	4.816	5.391	-0.575
Serchhip	4.902	6.184	-1.282
Champhai	4.972	6.361	-1.389
Lunglei	4.942	5.536	-0.594
Siaha	3.235	5.235	-2.000
Lawngtlai	4.516	5.366	-0.850

Source: Field Survey, 2022

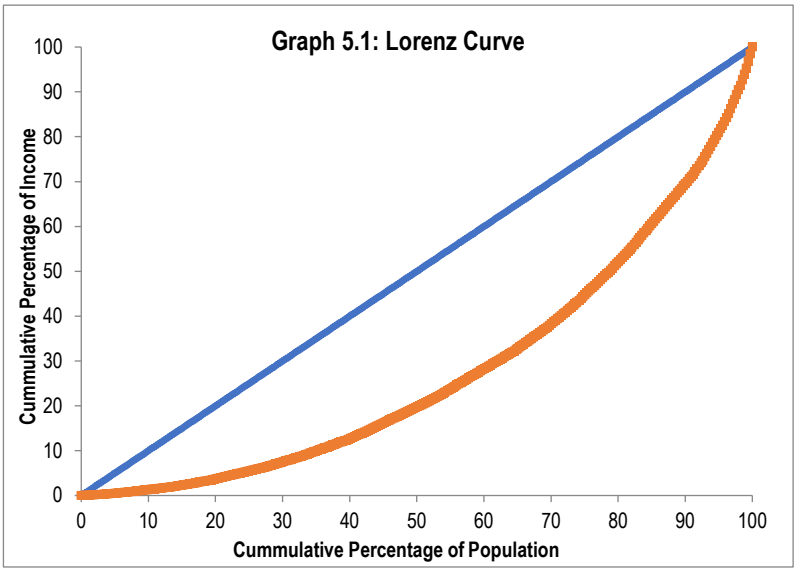
The above table, i.e., table 5.23 shows Empathy dimension score in various districts of Mizoram. The lowest negative mean gap score in Empathy is achieved by Civil Hospital, Aizawl with a score of -0.575 followed by Civil Hospital, Lunglei; District Hospital, Mamit; District Hospital, Lawngtlai and District Hospital, Kolasib with a score of -0.594, -0.625, -0.850, -0.888 respectively.

On the other hand, there are three districts with a negative Empathy gap score of more than -1, viz., District Hospital, Siaha with a score of -2.000 followed by District

Hospital, Champhai and District Hospital, Serchhip with a score of -1.389 and -1.282 respectively.

5.4: SECTION–C: Brief Analysis of Income Inequality Among Public Healthcare Beneficiaries

In this section, i.e., Section 5.4 shows a brief highlight of income inequality among public healthcare beneficiaries across Mizoram using Gini Index and Lorenz Curve. The result shows that the Gini Index among the 420 public healthcare beneficiaries is 0.474 which shows that income inequality is moderately low. The following graph highlights the Lorenz Curve:



The above graph, i.e., graph 5.1 highlights the Lorenz Curve of public healthcare beneficiaries in Mizoram. The straight line is the line of perfect equality and the curve represents the Lorenz Curve.

5.5: SECTION–D: Testing of Various Hypotheses

In this section, i.e., Section–D, various hypotheses are tested in order to elicit inter-relationships among the various parameters being employed in the analysis of patients' satisfaction across various public hospital establishments across Mizroam. The following tables show such testing of hypotheses and interpretation of their results:

Table 5.24: Reliability Statistics

Dimensions	***Cronbach's Alpha***
Tangibles	.899
Reliability	.866
Assurance	.867
Responsiveness	.868
Empathy	.886
Satisfaction	.867
Word of mouth	.882

Source: Own Calculation

The above table, i.e., table 4.24 shows the reliability statistics or Cronbach's Alpha α of various dimensions and parameters being employed in the analysis of patients' satisfaction. All dimensions and parameters have α value greater than 0.8 which shows that the data are reliable for further statical tests.

Table 5.25: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.935
Bartlett's Test of Sphericity	Approx. Chi-Square	9040.654
	df	351
	Sig.	0.000

Source: Own Calculation

The above table, i.e., table 5.25 shows the KMO and Bartlett test of sampling adequacy. It can be seen that the KMO value is greater than 0.5, i.e., 0.935 which shows that the sample size is adequate for factor analysis and other statistical tests. Also, Bartlett's measure tests the null hypothesis that the correlation matrix is an identity matrix and a significant test with *($p<0.000$)* is found.

Table 5.26: Normality Test of Various Dimensions						
Dimensions	**Kolmogorov-Smirnov**			**Shapiro-Wilk**		
	Statistic	***df***	***Sig.***	***Statistic***	***df***	***Sig.***
Tangibles	.206	420	.000	.903	420	.000
Reliability	.241	420	.000	.861	420	.000
Assurance	.285	420	.000	.825	420	.000
Responsiveness	.238	420	.000	.850	420	.000
Empathy	.270	420	.000	.800	420	.000
Satisfaction	.277	420	.000	.864	420	.000
Word of mouth	.242	420	.000	.862	420	.000

Source: Own Calculation

The above table, i.e., table 5.26 shows the normality test of various dimensions and parameters for analyzing patients' satisfaction. The Kolmogorov-Smirnov test shows that the test is significant across all dimensions and parameters with *($p<0.000$).* Also, the Shapiro-Wilk test shows similar results with *($P<0.000$).* This implies that the data are not normally distributed. Moreover, since most of the data are categorical variables, non-parametric tests are employed for testing of various hypotheses.

Table 5.27: SERVQUAL Dimensions and Overall Satisfaction			
Null Hypothesis	***Test***	***Significance***	***Decision***
The distribution of tangible dimension is the same across categories of overall satisfaction	Independent samples Mann-Whitney U Test	0.175	Retain the Null Hypothesis
The distribution of reliability dimension is the same across categories of overall satisfaction	Independent samples Mann-Whitney U Test	0.00	Reject the Null Hypothesis
The distribution of assurance dimension is the same across categories of overall satisfaction	Independent samples Mann-Whitney U Test	0.00	Reject the Null Hypothesis
The distribution of responsiveness dimension is the same across categories of overall satisfaction	Independent samples Mann-Whitney U Test	0.00	Reject the Null Hypothesis
The distribution of empathy dimension is the same across categories of overall satisfaction	Independent samples Mann-Whitney U Test	0.00	Reject the Null Hypothesis
The distribution of word-of-mouth dimension is the same across categories of overall satisfaction	Independent samples Kruskal-Wallis Test	0.00	Reject the Null Hypothesis

Source: Own Calculation

The above table, i.e., table 5.27 shows various hypotheses test, viz., SERVQUAL dimensions with overall satisfaction and Word-of-mouth with overall satisfaction.

An independent samples *Mann-Whitney U test* is used to examine whether the distribution of tangible dimension is the same across all categories of overall satisfaction. No significant result was found *($U=3.855, p>0.05$, i.e., 0.175)*. Hence, the null hypothesis is retained.

In reliability dimension, the *Mann-Whitney U test* shows a significant result, i.e., *($U=6.074$, $p<0.05$, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of reliability dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of

32.88 while patients who are satisfied scored a mean rank of 217.53. This shows that reliability dimension plays a crucial role in patients' overall satisfaction.

Mann-Whitney U test in assurance dimension gives a significant result, i.e., *(U=5.700, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of assurance dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 56.22 while patients who are satisfied scored a mean rank of 216.61. This shows that assurance dimension plays a crucial role in patients' overall satisfaction.

Again, with regard to responsiveness dimension, the independent samples *Mann-Whitney U test* gives a significant result, i.e., *(U=6.049, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of responsiveness dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 34.41 while patients who are satisfied scored a mean rank of 217.47. This shows that responsiveness dimension plays an important role in patients' overall satisfaction.

Also, an independent samples *Mann-Whitney U test* is used to examine whether the distribution of empathy dimension is the same across all categories of overall satisfaction. A significant result was found *(U=6.245, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of empathy dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 22.16 while patients who are satisfied scored a mean rank of 217.96. This shows that empathy dimension plays an important role in patients' overall satisfaction.

Finally in word-of-mouth *Kruskal-Wallis test* is employed. It shows a significant result of *(H(6)=1.590, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of word-of-mouth dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across

various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 41.38 while patients who are satisfied scored a mean rank of 217.20. This shows that word-of-mouth, i.e., negative or positive commends from others play an important role in patients' overall satisfaction and making use of public hospitals' services.

Table 5.28: Geographical Dimensions and Overall Satisfaction

Null Hypothesis	***Test***	***Significance***	***Decision***
The distribution of overall satisfaction is the same across categories of residential area	Independent samples Kruskal-Wallis Test	0.00	Reject the Null Hypothesis
The distribution of overall satisfaction is the same across categories of various districts	Independent samples Kruskal-Wallis Test	0.00	Reject the Null Hypothesis

Source: Own Calculation

The above table, i.e., table 5.28 shows two hypotheses test, viz., residential area with overall satisfaction and various districts with overall satisfaction which highlights the inter-relationship between geographical dimension and overall satisfaction.

An independent samples *Kruskal-Wallis test* is used to examine whether the distribution of overall satisfaction is the same across categories of residential area. A significant result was found *(H(3)=24.079, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of satisfaction with regard to the residential area of patients. This indicates that patients' overall satisfaction across various residential areas differ. Follow-up pairwise comparison indicated that patients from RD Block town are more inclined to be satisfied with the healthcare services being provided by public hospitals as compared to other residential areas.

Kruskal-Wallis test of independent sample is used to examine whether the distribution of overall satisfaction is the same across categories of various district. A significant result was found *(H(7)=95.253, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of satisfaction with regard

to various district of patients. This indicates that patients' overall satisfaction across various districts differ. Follow-up pairwise comparison indicated that patients from Lawngtlai district are more inclined to be satisfied with the healthcare services being provided by public hospitals as compared to other districts.

Table 5.29: Socioeconomic Dimensions and Overall Satisfaction

Null Hypothesis	***Test***	***Significance***	***Decision***
The distribution of overall satisfaction is the same across categories of educational qualification	Independent samples Kruskal-Wallis Test	0.593	Retain the Null Hypothesis
The distribution of overall satisfaction is the same across categories of income distribution	Independent samples Kruskal-Wallis Test	0.888	Retain the Null Hypothesis
The distribution of overall satisfaction is the same across categories of economic status	Independent samples Kruskal-Wallis Test	0.641	Retain the Null Hypothesis
The distribution of overall satisfaction is the same across categories of gender	Independent samples Mann-Whitney U Test	0.571	Retain the Null Hypothesis
The distribution of overall satisfaction is the same across categories of various occupation	Independent samples Kruskal-Wallis Test	0.375	Retain the Null Hypothesis

Source: Own Calculation

The above table, i.e., table 5.29 shows five hypotheses test which highlights the inter-relationship between socioeconomic dimension and overall satisfaction.

An independent samples *Kruskal-Wallis test* is used to examine whether the distribution of overall satisfaction is the same across categories of educational qualification. An insignificant result was found *(H(3)=1.901, p>0.05, i.e., 0.593)*. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on educational qualification, i.e., patients' overall satisfaction is not influenced by educational qualification.

With regard to income distribution and overall satisfaction, an independent samples *Kruskal-Wallis test* is used. An insignificant result was found *(H(3)=0.636, p>0.05, i.e., 0.888)*. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on income, i.e., patients' overall satisfaction is not influenced by monetary income, housing type, occupation or the type of ration card that the family owns.

Also, to highlight the relationship between poverty status and overall satisfaction, an independent samples *Kruskal-Wallis test* is employed. An insignificant result was found *(H(2)=0.888, p>0.05, i.e., 0.641)*. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on economic status, i.e., patients' overall satisfaction is not influenced by monetary income, housing type, occupation or the types of ration card the family owns.

The *Mann-Whitney U test* an insignificant result, i.e., *(U=22.562, p>0.05, i.e., 0.571)* with regard to the relationship between gender and overall satisfaction. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on gender, i.e., patients' overall satisfaction is not influenced by gender.

Finally, *Kruskal-Wallis test* shows that there is an insignificant result in the analysis of the relationship between occupation and overall satisfaction with *(H(6)=6.451, p>0.05, i.e., 0.375)*. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on occupation, i.e., patients' overall satisfaction is not influenced by the means through which they earn their livelihood.

CHAPTER VI

FINDINGS, RECOMMENDATIONS AND CONCLUSION

FINDINGS

On Healthcare Expenditure Across the Globe

- The share of healthcare expenditure expressed in GDP has been stagnating below 10 percent. At the same time, the per capita expenditure on healthcare has been increasing gradually year by year.
- The total health expenditure as a percentage of GDP has been stagnating over the years in SAARC countries and well below the global average. The total average health expenditure of SAARC countries is highest in 2016 with 5.479 percent of GDP and lowest in 2019 with barely 3.295 percent of GDP.
- India has been spending below 5 percent of its GDP over the years and actually decreases from 3.596 and 3.504 percent in 2015-16 to 2.952 and 3.104 in 2.018-19.
- Bangladesh has the lowest health expenditure with 2.507 percent of its GDP from 2015-19 among the SAARC countries. Pakistan, Sri Lanka, Bhutan and Nepal are in the median group with 3.012, 3.868, 3.505 and 4.917 percent of their GDP during 2105-19.
- Maldives and Afghanistan have the highest health expenditure with 8.780 and 12.382 percent of their GDP during 2015-19. Only Afghanistan has health expenditure higher than the global average with an average of 12.382 percent of its GDP during 2015-19.
- The total average per capita health expenditure (nominal) among the SAARC countries during 2015-19 is 170.350 USD which is drastically below the global average. The year 2016 marks the highest average per capita health expenditure with 180.037 USD and the lowest being 2015 with 158.512 USD.
- India's per capita health expenditure in PPP shows a gradual increase during the first two years but declined in the succeeding years–196.498 and 204.647 USD in 2015 and 2016 but declined to 181.529 and 195.565 USD in 2018 and 2019; but in 2019 it starts to increase again with 211.002 USD. The average total per capita health expenditure expressed in PPP for India is 197.848 during 2015-19.

- Sri Lanka, Bhutan and Maldives have an average per capita health expenditure in PPP with 495.942, 369.791 and 1605.857 USD over the five-year period of 2015-19. Pakistan has the lowest average per capita health expenditure in PPP with a picayune amount of 33.11 USD during 2015-19. Bangladesh, Afghanistan and Nepal have an average per capita health expenditure in PPP with 105.517, 257.076 and 168.486 USD respectively during 2015-19. The average total per capita health expenditure among the SAARC countries during 2015-19 is 417.539 USD.
- The share of health expenditure in India as a percentage of GDP has been increasing in the first year, i.e., 2015 but declined in the succeeding three years with 3.596 percent in 2015 and 3.504, 2.936 and 2.952 percent in 2016, 2017 and 2018. Meanwhile, the per capita health expenditure shows a gradual increase over the years except one year with 58.917 and 60.603 USD in 2015 and 2016 that decline to 57.557 USD in 2017; then it starts to increase yet again with 60.266 and 63.748 USD in 2018 and 2019.
- The per capital health expenditure in India expressed in PPP shows a cyclical ups and downs with an increasing trend in the first two years with 196.498 and 204.647 USD in 2015 and 2016, then declines to 181.529 and 195.565 USD in 2017 and 2018; but since its first two fluctuated years it shows an increasing trend again with 211.002 USD in 2019.
- In North-East India, Mizoram has the highest health expenditure as the share of its total expenditure with 645 crores out of 7731 crores INR being spent on health in 2015-16. Also, Mizoram has the highest health expenditure as a percentage of its total state expenditure with 8.34 percent.
- The absolute highest health expenditure as well as state total expenditure among the North-East is the state of Assam with 4922 crores out of 70428 crores INR being spent in health which is 7.09 percent of its total state expenditure in 2015-16.
- Manipur has the lowest health expenditure as a share of its total state expenditure with 536 crores out of 9841 crores INR being spent on health in 2015-16 which is 5.45 percent of its total state expenditure. Arunachal Pradesh, Nagaland and Sikkim spend

below 6 percent of its total state expenditure on health with 5.73, 5.79 and 5.56 percent while Meghalaya and Tripura spend 6.73 and 6.62 percent respectively.

- The total state expenditure on health among the North-East states is 9194 crores INR which amounts to 6.70 percent of its total state expenditure of 137117 crores INR with a population of 4.69 crores.
- Mizoram has the highest per capita health expenditure among the North-East states with 5862 INR which is equal to 4.20 percent of its GSDP of 15339 crores INR in 2015-16. Assam has the lowest per capita health expenditure with only 1546 INR which is equal to barely 2.21 percent of its GSDP of 226276 crores INR in 2015-16. On the other hand, Sikkim has the lowest health expenditure as a share of its GSDP with 1.81 percent of 16954 crores INR in 2015-16; but its per capita health expenditure is higher than Assam with 5126 INR.
- Manipur, Meghalaya, Nagaland and Tripura spend below 3 percent of their GSDP on health with 2.79, 2.40, 2.97 and 2.41 percent while Arunachal Pradesh spends 3.29 percent in 2015-16. The total per capita health expenditure among the North-East states is 26628 INR in 2015-16 and the total health expenditure as a share of GSDP is barely 2.42 percent out of 378386 crores INR expressed in current price.

On Trends and Pattern of Public Hospitals' Services in Mizoram

- The total patient care being done at various Public Hospitals in Mizoram during 2016-21 is highest in Civil Hospital, Aizawl–OPD as well as Casualty patients–throughout the study period, i.e., 2016-21, with a total out-patient care (OPD and Casualty) of 1951597 during this period.
- Civil Hospital, Lunglei records the second highest total patient care with 475303 total patient care followed by Referral Hospital, Falkawn and District Hospital, Kolasib with a total patient care of 309478 and 219081 respectively during 2016-21.
- Kulikawn Hospital has the lowest OPD and Casualty patient care with 73853 total patient care during 2016-21. Besides Kulikawn Hospital, only Regional Cancer Centre and District Hospital, Mamit record a total patient care less than 100,000 with 53811 and 99700 respectively during 2016-21. District Hospital, Champhai,

Serchhip, Siaha and Lawngtlai have a total patient care of more than 100,000 but less than 200,000 with 168616, 160010, 135436, 122282 respectively.

- The total OPD care is highest in 2019-20 with 789216 total patient care and lowest in 2020-21 with a total patient care of 515663 between 2016 and 2021. The trend in OPD care has been increasing gradually with a sharp decline in the last year of the study period.
- The total Casualty care or treatment is highest in 2018-19 with 101485 patient care and lowest in 2020-21 with a total patient care of only 72467 between 2016 and 2021. The total recorded patient care during the study period (i.e., 2016-21) is 3769167.
- Civil Hospital, Aizawl has the highest bed strength among the Public Hospitals in Mizoram with a gradual increase in the number of beds over the years from 257 in 2016-17 to 305 in 2020-21.
- The second highest bed strength is recorded by Referral Hospital, Falkawn with 159 in 2016-17 to 236 in 2020-21 followed by Civil Hospital, Lunglei with 120 in 2016-17 to 180 in 2020-21.
- Kulikawn Hospital, District Hospital, Serchhip, District Hospital, Kolasib, District Hospital, Mamit and Regional Cancer Centre have a constant bed strength over the years with 50, 60, 60, 30 and 50 respectively from 2016-21.
- The number of beds in District Hospital, Siaha has been stagnating in first four years, i.e., 45 beds in 2016-20 but increased sharply in 2020-21 to 100 beds, which is the highest rate of increase recorded among Public Hospitals in Mizoram.
- District Hospital, Champhai shows gradual increase in bed strength over the years with 60 beds in 2016-17 to 85 beds in 2019-20 to 111 beds in 2020-21. Among the bed strength which shows an increase, District Hospital, Lawngtlai records the lowest rate of increase with 30 beds in 2016-17 to 34 beds in 2019-20 but only 35 beds in 2020-21.
- Over the years, the total number of bed strength in various Public Hospital in Mizoram has been increasing with 921 beds in 2016-17 to 1217 beds in 2020-21.
- Civil Hospital, Aizawl has the highest admission (OPD and Casualty) throughout the study period, i.e., 2016-21 with a total admission (OPD and Casualty) of 71772 during

this period. Kulikawn Hospital has the lowest total admission (OPD and Casualty) with 5158 admissions during 2016-21.

- Referral Hospital, Falkawn records the second highest admission (OPD and Casualty) with 28208 total admission followed by Civil Hospital, Lunglei, District Hospital, Champhai and Kolasib with a total admission of 27724, 21297 and 20536 respectively during 2016-21.
- Besides Kulikawn Hospital, only Regional Cancer Centre and District Hospital, Mamit record a total admission less than 100,000 with 5667 and 9071 respectively during 2016-21. District Hospitals, Serchhip, Siaha and Lawngtlai have a total admission (OPD and Casualty) of more than 10,000 but less than 20,0000 with 13948, 12766 and 10236 respectively.
- The total OPD admission is highest in 2018-19 with 40395 admissions and lowest in 2020-21 with a total admission of 32087 between 2016 and 2021. The total admission through Casualty highest in 2017-18 with 8795 admissions and lowest in 2019-20 with a total admission of only 6429 between 2016 and 2021. The total recorded admissions during the study period (i.e., 2016-21) is 226383.
- Civil Hospital, Aizawl has the highest operations done throughout the study period, i.e., 2016-21 with a total operation (Major and Minor) of 81848 during this period. Regional Cancer Centre has the lowest operations done (Minor only) with 51 minor operations done during 2016-21.
- Referral Hospital, Falkawn records the second highest total operations done (Major and Minor) with 27553 total operations done followed by Civil Hospital, Lunglei, District Hospitals, Kolasib and Serchhip with total operations done of 22400, 12552 and 11969 respectively during 2016-21.
- Besides Regional Cancer Centre, only Kulikawn Hospital records total operations done less than 2000 with 1962 during 2016-21. District Hospitals, Champhai, Siaha, Mamit and Lawngtlai have total operations (Major and Minor) less than 5000 with 3158, 4429, 2780 and 2547 respectively.
- The total Major operations is highest in 2019-20 with 12166 operations done and lowest in 2020-21 with total operations of 7855 between 2016 and 2021. The total

Minor operations done is highest in 2016-17 with 28089 operations and lowest in 2020-21 with a total operation of only 15401 between 2016 and 2021. The total recorded operations done during the study period (i.e., 2016-21) is 171249.

- Civil Hospital, Aizawl has the highest Child Delivery throughout the study period, i.e., 2016-21 with a Child Delivery (Male and Female) of 20745 during this period. Regional Cancer Centre has the lowest Child Delivery (Male and Female) with 151 deliveries 2020-21.
- District Hospital, Champhai records the second highest total deliveries (Male and Female) with 4222 deliveries followed by Referral Hospital, Flakawn with 4031 total deliveries during 2016-21.
- Besides Regional Cancer Centre, only Kulikawn Hospital records deliveries less than 1000 with 374 deliveries during 2016-21. District Hospitals, Mamit, Lawngtlai and Serchhip have total deliveries (Male and Female) more than 1000 but less than 3000 with 1244, 2001 and 2066 respectively.
- District Hospitals, Lunglei, Kolasib and Siaha have total deliveries more than 3000 but less than 4000 with 3829, 3465 and 3280 respectively.
- The total male child delivery is highest in 2019-20 with 4882 deliveries and lowest in 2020-21 with total deliveries of 4327 between 2016 and 2021. The total female child delivery is highest in 2019-20 with 4771 deliveries and lowest in 2020-21 with a total delivery of 4346 between 2016 and 2021. The total recorded child delivery during the study period (i.e., 2016-21) is 45412.
- Civil Hospital, Aizawl has the highest Still Birth throughout the study period, i.e., 2016-21 with still births (Male and Female) of 227 during this period. Kulikawn Hospital has the lowest still birth (male only) with 1 still birth in 2018-19.
- District Hospital, Lunglei records the second highest still birth (Male and Female) with 41 still births followed by District Hospital, Kolasib with 38 still births during 2016-21.
- Regional Cancer Centre and District Hospital, Serchhip record still birth less than 10 with 2 and 5 still births respectively during 2016-21. District Hospitals, Siaha,

Lawngtlai, Referral Hospital, Falkawn, District Hospitals, Mamit and Champhai have still birth (Male and Female) less than 30 with 10, 12, 20, 21 and 27 respectively.

- The total male still birth is highest in 2016-17 with 61 still births and lowest in 2019-20 with total still births of 26 between 2016 and 2021. The total female still birth is highest in 2017-18 with 48 still births and lowest in 2019-20 with a total still birth of 26 between 2016 and 2021. The total recorded still birth during the study period (i.e., 2016-21) is 404.
- Civil Hospital, Aizawl has the highest discharge throughout the study period, i.e., 2016-21 with discharge (Live and Death) of 69689 during this period. Regional Cancer Centre has the lowest discharge (Live and Death) followed by Kulikawn Hospital with 5545 and 5610 discharge respectively during 2016-21.
- District Hospital, Lunglei records the second highest discharge (Live and Death) with 5610 discharges followed by Referral Hospital, Falkawn with 26345 discharges during 2016-21.
- District Hospitals, Mamit and Lawngtlai record a total discharge of less than 1000 (Live and Death) with 8008 and 8726 respectively during 2016-21. District Hospitals, Kolasib, Champhai, Siaha and Serchhip record total discharge (Live and Death) of more than 10000 but less than 20000 with 19241, 15270, 12824 and 11128 respectively during 2016-21.
- The total live discharge is highest in 2017-18 with 42892 discharges and lowest in 2020-21 with a total discharge of 32885 between 2016 and 2021. The total death discharge is highest in 2019-20 with 1536 discharges and lowest in 2020-21 with a total discharge of 1271 between 2016 and 2021. The total recorded discharge during the study period (i.e., 2016-21) is 209146.
- Medicine department has the highest patients throughout the study period across various Public Hospitals in Mizoram, i.e., 2016-21 with patients (New Case and Old Case) of 755135 during this period.
- Emergency department records the second highest patients (New Case and Old Case) with 448416 patients followed by Pediatric, ART, Gyne & Obst., Ophthalmology,

Dressing, Dental and NCD with 363675, 297429, 265526, 241036, 228415, 226175 and 209122 respectively during 2016-21.

- Departments with patients less than 100000 (New Case and Old Case) are DTC followed by Physiotherapy, Psychiatric, Cardiology, and Oncology with 26326, 40539, 40487, 65399 and 69041 patients respectively during 2016-21.
- Departments with patients less than 200000 (New Case and Old Case) are ENT followed by Orthopedic, Surgery, Dermatology and Dressing with 189136,184649, 181673, 159232, 152140 patients respectively.
- The total New Case is highest in 2019-20 with 662281 patients and lowest in 2020-21 with a total patient of 427742 between 2016 and 2021.
- Civil Hospital, Aizawl has the highest cumulative days of patients discharged throughout the study period, i.e., 2016-21 with cumulative total days of 399550. Regional Cancer Centre has the lowest cumulative days of patients discharged followed by District Hospital, Lawngtlai with 33219 and 37835 cumulative total days of patients discharged respectively during 2016-21.
- Referral Hospital, Falkawn records the second highest cumulative days of patients discharged with 198846 followed by Civil Hospital, Lunglei with 136621 cumulative days of patients discharged during 2016-21. District Hospitals, Kolasib, Siaha, Serchhip and Champhai record total cumulative days of patients discharged of more than 50000 but less than 100000 with 90444, 75174, 63938 and 52254 respectively during 2016-21.
- The total days of patients discharged is highest in 2019-20 with 264239 total days and lowest in 2020-21 with total days of patients discharged of 195099 between 2016 and 2021. The total recorded cumulative days of patients discharged during the study period (i.e., 2016-21) is 1174875.
- Referral Hospital, Falkawn has the highest average length of stay throughout the study period, i.e., 2016-21 with 7.99. District Hospital, Mamit has the lowest average length of stay followed by District Hospital, Champhai with 3.66 and 3.76 respectively during 2016-21.

- Kulikawn Hospital, Civil Hospital, Aizawl and District hospital, Siaha record an average length of stay higher than 6 days with 7.91 and 7.51 and 6.32 respectively during 2016-21.
- Regional Cancer Centre, District Hospital, Serchhip and Civil Hospital, Lunglei, record an average length of stay higher than 5 days but less than 6 days with 5.79, 5.76 and 5.32 respectively during 2016-21.
- District Hospitals, Lawngtlai and Kolasib record an average length of stay higher than 4 days but less than 5 days with 4.44 and 4.31 respectively during 2016-21.
- The total average length of stay is highest in 2020-21 with 6.51 total days and lowest in 2017-18 with an average length of stay of 5.14 between 2016 and 2021. The total average length of stay during the study period (i.e., 2016-21) is 5.70.
- Civil Hospital, Aizawl has the highest total in-patient census throughout the study period, i.e., 2016-21 with a cumulative total of 402035.
- Referral Hospital, Falkawn records the second highest total in-patient census of 217743 followed by Civil Hospital, Lunglei with 141636 during 2016-21. District Hospitals, Champhai and Kolasib record total in-patient census of more than 55000 but less than 65000 with 60368 and 56881 respectively during 2016-21.
- Regional Cancer Centre has the lowest in-patient census followed by District Hospital, Siaha with cumulative total in-patient census of 5749 and 12818 respectively during 2016-21. District Hospitals, Serchhip, Mamit and Lawngtlai record total in-patient census higher than 20000 but less than 30000 with 18141, 20049 and 22065 respectively during 2016-21.
- The total in-patient census is highest in 2019-20 with 232042 and lowest in 2020-21 with 161145 between 2016 and 2021. The total cumulative in-patient census during the study period (i.e., 2016-21) is 996713.
- Regional Cancer Centre has the highest average bed occupancy throughout the study period, i.e., 2016-21 with a bed occupancy rate of 0.86. District Hospital, Champhai has the lowest average bed occupancy followed by Kulikawn Hospital with an average bed occupancy rate of 0.43 and 0.47 respectively during 2016-21.

- Civil Hospital, Aizawl has the second highest average bed occupancy rate of 0.81 during 2016-21. Referral Hospital, Falkawn, District Hospitals, Serchhip, Mamit and Lawngtlai record an average bed occupancy rate of higher than 50 but less than 70 percent with 0.54, 0.57, 0.62 and 0.63 respectively during 2016-21.
- District Hospital, Kolasib, Civil Hospital, Lunglei and District Hospital, Siaha record an average bed occupancy rate of higher than 70 but less than 80 percent with 0.73, 0.74 and 0.79 respectively during 2016-21.
- The average bed occupancy is highest in 2018-19 and 2019-20 with 0.71 in both years and lowest in 2020-21 with 0.56 between 2016 and 2021. The total average bed occupancy rate during the study period (i.e., 2016-21) is 0.88.
- District Hospital, Kolasib has the highest bed turnover ratio throughout the study period, i.e., 2016-21 with a ratio of 5.29. Kulikawn Hospital has the lowest bed turnover ratio with 1.87 during 2016-21.
- District Hospital, Mamit has the second highest bed turnover ratio with a ratio of 4.72 followed by Civil Hospital, Aizawl, District Hospitals, Lawngtlai and Siaha with a ratio of 4.62, 4.53 and 4.37 respectively during 2016-21.
- District Hospital, Champhai, Civil Hospital, Lunglei and District Hospital Serchhip have a bed turnover ratio of more than 3 but less than 4 with 3.82, 3.59 and 3.04 respectively during 2016-21.
- The bed turnover ratio is highest in 2016-17 with 3.83 and lowest in 2019-20 and 2020-21 with 3.52 for both years. The total bed turnover ratio during the study period (i.e., 2016-21) is 3.63.
- Civil Hospital, Aizawl has the highest daily census of indoor patients throughout the study period, i.e., 2016-21 with 26115 cumulative total. District Hospital, Mamit has the lowest daily census of indoor patients with 1647 during 2016-21.
- Referral Hospital, Falkawn has the second highest daily census of indoor patients with a 13922 followed by Civil Hospital, Lunglei, with 10199 during 2016-21.
- Kulikawn Hospital, District Hospital, Champhai, Regional Cancer Centre and District Hospital, Lawngtlai have daily census of indoor patients of between 2000 and 3000 with 2916, 2881, 2388 and 2049 respectively during 2016-21.

- District Hospitals, Kolasib, Siaha and Serchhip have daily census of indoor patients between 4000 and 5500 with 5168, 4864 and 4120 respectively during 2016-21.
- The maximum daily census of indoor patients is highest in 2019-20 with 10303 and lowest in 2016-17 with 8720 between 2016 and 2021. The minimum daily census of indoor patients is highest in 2019-20 with 6700 and lowest in 2020-21 with 5054 between 2016 and 2021.The cumulative total daily indoor patients during the study period (i.e., 2016-21) is 76201.
- Civil Hospital, Aizawl has the highest number of autopsies done throughout the study period, i.e., 2016-21 with 402 cumulative total. Kulikawn Hospital, Regional Cancer Centre and Referral Hospital, Falkawn have no autopsy done during 2016-21.
- The second highest number of autopsies done by Public Hospital establishment is Civil Hospital, Lunglei with a total cumulative of 87 autopsies during the study period, i.e., 2016-21.
- District Hospitals, Serchhip, Siaha and Mamit have less than 10 autopsies done during the study period, i.e., 2016-21 with a cumulative total of only 2, 9 and 9 autopsies done respectively. District Hospitals, Champhai, Kolasib and Lawngtlai have less than 50 autopsies done during 2016-21 with 24, 40 and 43 respectively.
- The highest number of autopsies done is in 2019-20 where a total of 157 and the lowest is in 2017-18 with 111 between 2016 and 2021. The cumulative total number of autopsies done across the various Public Hospital establishments during the study period, i.e., 2016-21 is 616.
- Civil Hospital, Aizawl has the highest number of cases referred outside Mizoram throughout the study period, i.e., 2016-21 with 11208 cumulative total.
- The second highest number of cases referred outside Mizoram by Public Hospital establishment is Civil Hospital, Lunglei with a cumulative total of 908 cases referred followed by Regional Cancer Centre with a cumulative total of 22 during the study period, i.e., 2016-21.
- Kulikawn Hospital, Referral Hospital, Falkawn, District Hospitals, Champhai, Serchhip, Siaha, Kolasib, Mamit and Lawngtlai have no cases referred outside Mizoram during 2016-21.

- Cases referred outside Mizoram is highest in 2017-18 with a total of 2926 and lowest in 2020-21 with a total of 1183 between 2016 and 2021. The cumulative total number of cases referred outside Mizoram across the various Public Hospital establishments during the study period, i.e., 2016-21 is 12138.
- Civil Hospital, Aizawl has the highest number of Mizoram State Healthcare Scheme beneficiaries throughout the study period, i.e., 2016-21 with 12688 cumulative total. Regional Cancer has the second highest Mizoram State Healthcare Scheme beneficiaries with a cumulative total of 3176 during 2016-21.
- Civil Hospital, Lunglei and Referral Hospital, Falkawn have Mizoram State Healthcare Scheme beneficiaries higher than 1000 with 1087 and 1409 beneficiaries respectively during the study period, i.e., 2016-21.
- District Hospital, Siaha has the lowest Mizoram State Healthcare Scheme beneficiaries with only 37 followed by Kulikawn Hospital, District Hospitals, Mamit and Lawngtlai with 123, 162 and 216 beneficiaries respectively during 2016-21.
- District Hospitals, Kolasib, Champhai and Serchhip have Mizoram State Healthcare Scheme beneficiaries of 306, 401 and 476 respectively during 2016-21.
- Mizoram State Healthcare Scheme beneficiaries is highest in 2016-17 with 5144 and lowest in 2019-20 with 2022 during 2016-21. The cumulative total of Mizoram State Healthcare Scheme beneficiaries is 20081 between 2016 and 2021.
- Civil Hospital, Aizawl has the highest number of PMJAY beneficiaries throughout the study period, i.e., 2016-21 with 17492 cumulative total. Referral Hospital, Falkawn has the second highest PMJAY beneficiaries with a cumulative total of 11367 followed by Regional Cancer Centre and Civil Hospital, Lunglei with 9834 and 6112 beneficiaries respectively during 2016-21.
- Kulikawn Hospital has the lowest number of PMJAY beneficiaries with a cumulative total of only 728 during the study period, i.e., 2016-21. District Hospitals, Lawngtlai and Siaha have PMJAY beneficiaries less than 2000 with 1221 and 1991 beneficiaries respectively during 2016-21.

- District Hospitals–Mamit, Kolasib, Serchhip and Champhai have PMJAY beneficiaries of more than 2000 but less than 5000 with a cumulative total of 2580, 3489, 4277 and 4654 beneficiaries respectively during 2016-21.
- PMJAY beneficiaries is highest in 2019-20 with 18399 and lowest in 2016-17 with 10968 during 2016-21. The cumulative total of PMJAY beneficiaries is 63745 between 2016 and 2021.
- Civil Hospital, Aizawl has the highest laboratory investigations done throughout the study period, i.e., 2016-21 with 4041391 investigations done during this period. District Hospital, Mamit has the lowest laboratory investigations done with 29616 between 2016 and 2021.
- Referral Hospital, Falkawn records the second highest laboratory investigations done with 571989 followed by Civil Hospital, Lunglei and District Hospitals, Serchhip and Kolasib with 417196, 150554 and 148753 laboratory investigations done during 2016-21.
- District Hospital, Mamit, District Hospitals, Lawngtlai and Siaha and Kulikawn Hospital have laboratory investigations done less than 50000 with 35787, 40185 and 41023 respectively during 2016-21.
- District Hospital, Champhai and Regional Cancer Centre have more than 50000 but less than 100000 laboratory investigations done with 99143 and 58152 respectively during the study period, i.e., 2016-21.
- The total laboratory investigations done is highest in 2019-20 with 1426765 and lowest in 2017-18 with 867611 between 2016 and 2021. The cumulative total recorded laboratory investigations done during the study period (i.e., 2016-21) is 5633789.
- Civil Hospital, Aizawl has the highest X-Ray investigations done throughout the study period, i.e., 2016-21 with 117315 X-Rays done during this period. Regional Cancer Centre has the lowest X-ray investigations done with 918 between 2016 and 2021.
- Referral Hospital, Falkawn records the second highest X-Ray investigations done with 32168 followed by Civil Hospital, Lunglei and District Hospitals, Kolasib,

Champhai and Serchhip with 21504, 19736, 16164 and 15328 X-Ray investigations done during 2016-21.

- District Hospitals, Siaha, Lawngtlai, Kulikawn Hospital and District Hospital, Mamit have X-Ray investigations done less than 10000 with 4187, 6878, 7131 and 7370 respectively during 2016-21.
- The total X-Ray investigations done is highest in 2019-20 with 62611 and lowest in 2020-21 with 38662 between 2016 and 2021. The cumulative total recorded X-Ray investigations done during the study period (i.e., 2016-21) is 248699.
- Civil Hospital, Aizawl has the highest endoscopy investigations done throughout the study period, i.e., 2016-21 with 20573 endoscopies done during this period. Kulikawn Hospital, District Hospital, Siaha and Regional Cancer Centre have recorded nil or zero endoscopy investigation during the study period, i.e., 2016-21.
- Referral Hospital, Falkawn records the second highest endoscopy investigations done with 7551 followed by District Hospital, Lawngtlai with 2970 endoscopy investigations done during 2016-21.
- District Hospital, Mamit has the lowest endoscopy investigations done with 403 followed by District Hospital, Kolasib with 448 between 2016 and 2021. Civil Hospital, Lunglei, District Hospitals, Champhai and Serchhip have endoscopy investigations done below 2000 with 1546, 1088 and 1013 respectively during 2016-21.
- The total endoscopy investigation done is highest in 2019-20 with 9953 and lowest in 2020-21 with 4358 between 2016 and 2021. The cumulative total recorded endoscopy investigations done during the study period (i.e., 2016-21) is 35592.
- Civil Hospital, Aizawl has the highest ECG investigation done throughout the study period, i.e., 2016-21 with 40621 ECG done during this period. Kulikawn Hospital and Regional Cancer Centre have recorded nil or zero ECG investigation during the study period, i.e., 2016-21. Referral Hospital, Falkawn records the second highest ECG investigation done with 6056 ECG investigations done during 2016-21.
- District Hospital, Siaha has the lowest ECG investigation done with 104 followed by District Hospital, Mamit with 962 between 2016 and 2021. District Hospitals,

Champhai, Serchhip, Kolasib and Lawngtlai have ECG investigation done below 3000 with 2454, 2121, 1084 and 1022 respectively during 2016-21.

- The total ECG investigation done is highest in 2019-20 with 15448 and lowest in 2017-18 with 9267 between 2016 and 2021. The cumulative total recorded ECG investigation done during the study period (i.e., 2016-21) is 58773.
- Civil Hospital, Aizawl has the highest ultrasound investigation done throughout the study period, i.e., 2016-21 with 26857 ultrasounds done during this period. Referral Hospital, Falkawn records the second highest ultrasound investigation done with 19489 followed by Civil Hospital, Lunglei with 8750 during 2016-21.
- Regional Cancer Centre, Kulikawn Hospital and District Hospital, Mamit have recorded the lowest ultrasound investigation done during the study period, i.e., 2016-21 with 319,1081 and 1785 respectively.
- District Hospitals, Lawngtlai, Champahi and Serchhip have recorded less than 5000 ultrasound investigation done with 4340, 2529 and 2068 respectively between 2016 and 2021. District Hospitals, Kolasib and Siaha have ultrasound investigation done more than 5000 but less than 10000 with 7020 and 6289 respectively during 2016-21.
- The total ultrasound investigation done is highest in 2019-20 with 21143 and lowest in 2016-17 with 12101 between 2016 and 2021. The cumulative total recorded ultrasound investigation done during the study period (i.e., 2016-21) is 80527.
- Civil Hospital, Aizawl has the highest physiotherapy sessions done throughout the study period, i.e., 2016-21 with 103459 sessions done during this period. District Hospital, Siaha and Regional Cancer Centre have recorded nil or zero physiotherapy sessions during the study period, i.e., 2016-21.
- Referral Hospital, Falkawn records the second highest physiotherapy sessions done with 4024 sessions done during 2016-21. District Hospitals, Champhai, Kolasib, Serchhip, Lawngtlai and Mamit have recorded less than 500 physiotherapy sessions with 434, 262, 241 and 225 respectively between 2016 and 2021.

- The total physiotherapy sessions done is highest in 2018-19 with 32405 and lowest in 2016-17 with 17233 between 2016 and 2021. The cumulative total recorded physiotherapy sessions done during the study period (i.e., 2016-21) is 110799.
- Regional Cancer Centre has the highest physiotherapy sessions done throughout the study period, i.e., 2016-21 with 32737 chemotherapy dozes done followed by Civil Hospital, Lunglei with 727 chemotherapy dozes done during this period.
- The total chemotherapy doze done is highest in 2019-20 with 6923 and lowest in 2017-18 with 6393 between 2016 and 2021. The cumulative total recorded chemotherapy doze done during the study period (i.e., 2016-21) is 33464.
- Civil Hospital, Aizawl has the highest dietician consultation done throughout the study period, i.e., 2016-21 with 4055 consultations done during this period. The total dietician consultation done is highest in 2019-20 with 1151 and lowest in 2020-21 with 294 between 2016 and 2021. The cumulative total recorded dietician consultation done during the study period (i.e., 2016-21) is 4055.
- Civil Hospital, Aizawl has the highest colonoscopies done throughout the study period, i.e., 2016-21 with 4055 colonoscopies done followed by Referral Hospital, Falkawn with 233 colonoscopies done during this period.
- The total colonoscopies done is highest in 2020-21 with 310 and lowest in 2018-19 with 71 between 2016 and 2021. The cumulative total recorded colonoscopies done during the study period (i.e., 2016-21) is 635.
- Civil Hospital, Aizawl has the highest EEG done throughout the study period, i.e., 2016-21 with 2046 EEG done during this period. The total EEG done is highest in 2019-20 with 533 and lowest in 2017-18 with 276 between 2016 and 2021. The cumulative total recorded EEG done during the study period (i.e., 2016-21) is 2046.
- Civil Hospital, Aizawl has the highest PFT done throughout the study period, i.e., 2016-21 with 515 PFT done during this period. The total PFT done is highest in 2019-17 with 195 and lowest in 2020-21 with 46 between 2016 and 2021. The cumulative total recorded PFT done during the study period (i.e., 2016-21) is 515.

- Civil Hospital, Aizawl has the highest dialysis done throughout the study period, i.e., 2016-21 with 16171 followed by Civil Hospital, Lunglei with 3144 dialysis done during this period.
- District Hospitals, Champhai and Serchhip have recorded a modicum amount of dialysis done during the study period, i.e., 2016-21 with 51 and 45 respectively. The total dialysis done is highest in 2020-21 with 5766 and lowest in 2016-17 with 1830 between 2016 and 2021. The cumulative total recorded dialysis done during the study period (i.e., 2016-21) is 19411.
- Civil Hospital, Aizawl has the highest bronchoscopies done throughout the study period, i.e., 2016-21 with 449 followed by Referral Hospital, Falkawn with 57 bronchoscopies done during this period.
- The total bronchoscopies done is highest in 2020-21 with 207 and lowest in 2016-17 with nil or zero between 2016 and 2021. The cumulative total recorded bronchoscopies done during the study period (i.e., 2016-21) is 506.
- Regional Cancer Centre has the highest radiotherapies done throughout the study period, i.e., 2016-21 with 54538 during this period. The total radiotherapies done is highest in 2019-20 with 14079 and lowest in 2020-21 with 8486 between 2016 and 2021. The cumulative total recorded radiotherapies done during the study period (i.e., 2016-21) is 54538.
- Civil Hospital, Aizawl has the highest echo done throughout the study period, i.e., 2016-21 with 5965 followed by Referral Hospital, Falkawn with 1051 during this period. The total echo done is highest in 2018-19 with 2271 and lowest in 2020-21 with 347 between 2016 and 2021. The cumulative total recorded echo done during the study period (i.e., 2016-21) is 7016.
- Civil Hospital, Aizawl has the highest CT scan done throughout the study period, i.e., 2016-21 with 16895 followed by Regional Cancer Centre, Civil Hospital, Lunglei, Referral Hospital, Falkawn and Kulikawn Hospital with 6655, 2065, 598 and 1 respectively.

- The total CT scan done is highest in 2018-19 with 5990 and lowest in 2020-21 with 4578 between 2016 and 2021. The cumulative total recorded CT scan done during the study period (i.e., 2016-21) is 26214.

On Analysis of Economic Welfare Provision of Public Hospitals in Mizoram

- The actual average cost of investigation and follow-up is ₹517,401,350 in 2016-17; ₹469,632,500 in 2017-18; ₹660,738,775 in 2018-19; ₹758,408,750 in 2019-20; ₹594,193,650 in 2020-21 respectively. The total actual average cost of investigation and follow-up during the study period, i.e., 2016-17 to 2020-21 is ₹3,000,375,025.
- When actual costs are adjusted for inflation, the total actual cost is reduced to ₹2,375,820,952. Inflation adjusted actual average cost of investigations and follow-up is highest in 2019-20 with ₹479,839,342 and lowest in 2017-18 with ₹353,372,836.
- The actual average opportunity cost of investigation and follow-up is ₹2,581,560,420 in 2016-17; ₹2,343,219,000 in 2017-18; ₹3,296,738,730 in 2018-19; ₹3,784,060,500 in 2019-20; ₹2,964,713,580 in 2020-21 respectively.
- The total average opportunity cost of investigation and follow-up during the study period, i.e., 2016-17 to 2020-21 is ₹14,970,292,230. The average opportunity cost is highest in 2019-20 with ₹3,784,060,500 and lowest in 2017-18 with ₹2,343,219,000.
- When the actual opportunity costs of investigation and follow-up are adjusted for inflation, the total actual cost is reduced to ₹11,854,081,160. Inflation adjusted opportunity cost of investigations and follow-up is highest in 2019-20 with ₹3,331,039,172 and lowest in 2017-18 with ₹1,763,144,469.
- The actual monetary compensation–expressed as the difference between actual and opportunity cost–in investigation and follow-up is ₹2,064,159,070 in 2016-17; ₹1,873,586,500 in 2017-18; ₹2,635,999,955 in 2018-19; ₹3,025,651,750 in 2019-20; ₹2,370,519,930 in 2020-21 respectively.
- The total monetary compensation in investigations and follow-up to the public for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹11,969,917,205.

- The total monetary savings is highest in 2019-20 with ₹3,025,651,750 and lowest in 2017-18 with ₹1,873,586,500. When these monetary compensations are adjusted for inflation, the total actual monetary compensation is reduced to ₹9,478,263,205.
- Inflation adjusted monetary compensation in investigations and follow-up is highest in 2019-20 with ₹2,663,425,836 and lowest in 2017-18 with ₹1,409,771,632.
- The actual cost–expressed as the cost or consultation fee–in various public hospital establishment across Mizoram is ₹7,183,830 in 2016-17; ₹7,419,530 in 2017-18; ₹8,209,910 in 2018-19; ₹8,997,010 in 2019-20; ₹5,881,390 in 2020-21 respectively.
- The total actual cost for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹37,691,670. The total actual cost is highest in 2019-20 with ₹8,997,010 and lowest in 2016-17 with ₹7,183,830.
- When the actual costs of out-patient consultation are adjusted for inflation, the total actual cost is reduced to ₹28,600,382. Inflation adjusted total actual cost for availing healthcare services with regard to consultation of doctors is highest in 2019-20 with ₹7,919,903 and lowest in 2016-17 with ₹5,564,546.
- The actual average opportunity cost–expressed as the differences in cost or consultation fee between public and private hospitals–in various hospital establishments across Mizoram is ₹215,514,900 in 2016-17; ₹222,585,900 in 2017-18; ₹246,297,300 in 2018-19; ₹269,910,300 in 2019-20; ₹176,441,700 in 2020-21 respectively.
- The total actual opportunity cost for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹1,130,750,100. The total actual opportunity cost is highest in 2019-20 with ₹269,910,300 and lowest in 2020-21 with ₹176,441,700.
- When the actual opportunity costs of availing out-patient consultation are adjusted for inflation, the total actual opportunity cost is reduced to ₹858,011,531. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to consultation of doctors is highest in 2019-20 with ₹237,597,095 and lowest in 2016-17 with ₹107,129,143.
- The actual monetary compensation–expressed as the difference between actual and opportunity cost–in consultation of doctors is ₹208,331,070 in 2016-17;

₹215,166,370 in 2017-18; ₹238,087,390 in 2018-19; ₹260,913,290 in 2019-20; ₹170,560,310 in 2020-21 respectively.

- The total monetary compensation in consultation of doctors to the public for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹1,093,058,430. The total monetary compensation is highest in 2019-20 with ₹260,913,290 and lowest in 2020-21 with ₹170,560,310.
- When the monetary compensations from employing out-patient consultation are adjusted for inflation, the total actual monetary compensation is reduced to ₹829,411,148. Inflation adjusted monetary compensation in consultation of doctors employed in public hospitals is highest in 2019-20 with ₹229,677,192 and lowest in 2020-21 with ₹103,558,172.
- The actual opportunity cost of minor operations–expressed as the differences in cost of operations between public and private hospitals–in various hospital establishments across Mizoram is ₹208,897,893 in 2016-17; ₹188,267,655 in 2017-18; ₹197,177,181 in 2018-19; ₹178,012,032 in 2019-20; ₹114,537,237 in 2020-21 respectively.
- The total actual opportunity cost of minor operations for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹886,891,998. The total actual opportunity cost is highest in 2016-17 with ₹208,897,893 and lowest in 2020-21 with ₹114,537,237.
- When the actual opportunity costs of minor operations are adjusted for inflation, the total actual opportunity cost is reduced to ₹672,909,040. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to minor operations done is highest in 2016-17 with ₹161,810,916 and lowest in 2020-21 with ₹69,542,948.
- The actual opportunity cost of major operations–expressed as the differences in cost of operations between public and private hospitals–in various hospital establishments across Mizoram is ₹264,849,702 in 2016-17; ₹275,872,932 in 2017-18; ₹308,570,754 in 2018-19; ₹323,153,292 in 2019-20; ₹208,644,510 in 2020-21 respectively.
- The total actual opportunity cost of major operations for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹1,381,091,190. The total actual

opportunity cost is highest in 2019-20 with ₹323,153,292 and lowest in 2020-21 with ₹208,644,510.

- When the actual opportunity costs of major operations are adjusted for inflation, the total actual opportunity cost is reduced to ₹1,047,966,764. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to major operations done is highest in 2019-20 with ₹284,465,926 and lowest in 2020-21 with ₹126,681,548.
- The actual opportunity cost of in-patient stay–expressed as the differences in cost of in-patient stay between public and private hospitals–in various hospital establishments across Mizoram is ₹369,833,600 in 2016-17; ₹379,833,600 in 2017-18; ₹395,112,000 in 2018-19; ₹422,782,400 in 2019-20; ₹312,158,400 in 2020-21 respectively.
- The total actual opportunity cost of in-patient stay for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹1,879,720,000. The total actual opportunity cost is highest in 2019-20 with ₹422,782,400 and lowest in 2020-21 with ₹312,158,400.
- When the actual opportunity costs of in-patient stay are adjusted for inflation, the total actual opportunity cost is reduced to ₹1,420,910,640. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to in-patient care is highest in 2019-20 with ₹372,167,605 and lowest in 2020-21 with ₹189,531,511.

On Analysis of Efficiency and Productivity

- Firm no. 2, 3, 4, 9, 10 and 11 are technically inefficient when CRS (crs te) is assumed or they need to increase their output by 69.9, 0.7, 3.9, 12.4, 51.9, 24.7 percent respectively to become technically efficient in the year 2016-17.
- However, when VRS technical efficiency (vrs te) is assumed, only Firm 2, 4, 10 and 11 are technically inefficient but shows an increasing returns to scale–since vrs te is higher than crs te–where they need to increase their output by 69.8, 3.8, 49, 11.1 percent respectively in 2016-17.

- All other DMUs or firms viz., 1, 5, 6, 7, 8 and 9 are technically efficient in both crs te and vrs te. All DMUs exhibit an increasing returns to scale in the year 2016-17.
- The total crs te and vrs te depicts that overall technical efficiency is not achieved since output is required to be increased by 14.9 percent when constant returns to scale is assumed and 11.1 percent when variable returns to scale is assumed in the year 2016-17.
- Firm no. 2, 3, 4, 9, 10 and 11 are technically inefficient when CRS (crs te) is assumed or they need to increase their output by 77.6, 10.5, 7.9, 11, 46.5, 46.5 percent respectively to become technically efficient in the year 2017-18.
- When VRS technical efficiency (vrs te) is assumed, only Firm 2, 4, 9, 10 and 11 are technically inefficient but shows an increasing returns to scale–since vrs te is higher than crs te–where they need to increase their output by 74.5, 5.5, 5.1, 11.9, 27.3 percent respectively in 2017-18.
- The total crs te and vrs te depicts that overall technical efficiency is not achieved since output is required to be increased by 18.2 percent when constant returns to scale is assumed and 11.3 percent when variable returns to scale is assumed in the year 2017-18.
- Firm no. 2 and 10 are technically inefficient when CRS (crs te) is assumed or they need to increase their output by 65.1 and 54.7 percent respectively to become technically efficient in the year 2018-19.
- When VRS technical efficiency (vrs te) is assumed, only Firm 2 and 10 are technically inefficient but shows an increasing returns to scale–since vrs te is higher than crs te–where they need to increase their output by 65 and 20.6 percent respectively in 2018-19.
- All DMUs exhibit an increasing returns to scale in the year 2018-19. However, the total crs te and vrs te depicts that overall technical efficiency is not achieved since output is required to be increased by 10.9 percent when constant returns to scale is assumed and 7.8 percent when variable returns to scale is assumed in the year 2018-19.

- Firm no. 2, 4 and 10 are technically inefficient when CRS (crs te) is assumed or they need to increase their output by 55.8, 2.7 and 53.4 percent respectively to become technically efficient in the year 2019-20.
- When VRS technical efficiency (vrs te) is assumed, only Firm 2, 4 and 10 are technically inefficient but shows an increasing returns to scale–since vrs te is higher than crs te–where they need to increase their output by 51.1, 1.1 and 49.9 percent respectively in 2019-20.
- All other DMUs or firms are technically efficient in both crs te and vrs te. All DMUs exhibit an increasing returns to scale in the year 2019-20. However, the total crs te and vrs te depicts that overall technical efficiency is not achieved since output is required to be increased by 10.4 percent when constant returns to scale is assumed and 9.3 percent when variable returns to scale is assumed in the year 2019-20.
- Firm no. 2, 8, 10 and 11 are technically inefficient when CRS (crs te) is assumed or they need to increase their output by 18, 20.7, 77 and 1.3 percent respectively to become technically efficient in the year 2020-21.
- However, when VRS technical efficiency (vrs te) is assumed, only Firm 2 and 10 are technically inefficient but shows a constant (Firm no. 2) and increasing returns to scale (Firm no. 10)–since vrs te is higher than crs te–where they need to increase their output by 18 and 55.1 percent respectively in 2020-21.
- All other DMUs or firms are technically efficient in both crs te and vrs te. All DMUs except Frim no. 2 exhibit an increasing returns to scale in the year 2019-20. However, the total crs te and vrs te depicts that overall technical efficiency is not achieved since output is required to be increased by 10.6 percent when constant returns to scale is assumed and 6.6 percent when variable returns to scale is assumed in the year 2020-21.
- In terms of Malmquist output-oriented index, Firm no. 1, 2, 8 and 11 show a decline in total factor productivity (tfpch) with 0.975, 0.975, 0.956 and 0.846 respectively showing that the firms need to increase their output by 2.5, 2.5, 4.4 and 15.4 percent respectively to achieve a total factor productivity of 1 in 2017-18.

- All other DMUs or firms (3, 4, 5, 6, 7, 9 and 10) exhibit an increase in total factor productivity in terms of Malmquist output-oriented index with 1.053, 1.147, 1.135, 1.433, 1.123, 1.372 and 1.185 respectively due to the changes in the variable considered in 2017-18.
- There is an increase in total factor productivity in 2017-18 with 1.093 tfpch or an increase of 9.3 percent out of which; firm no. 11 has the lowest tfpch with 0.846; on the other hand, firm no. 6 has the highest tfpch with 1.433 or an increase in total factor productivity by 43.3 percent mainly due to an increase in technical efficiency (techch).
- In terms of Malmquist output-oriented index, Firm no. 5, 6, 7 and 10 show a decline in total factor productivity (tfpch) with 0.995, 0.510, 0.815 and 0.844 respectively. The firms need to increase their output by 0.5, 49, 18.5 and 15.6 percent respectively to achieve a total factor productivity of 1 in 2018-19.
- All other DMUs or firms (1, 2, 3, 4, 8, 9 and 11) exhibit an increase in total factor productivity in terms of Malmquist output-oriented index with 1.042, 1.325, 1.032, 1.087, 1.061, 1.077 and 1.948 respectively due to the changes in the variable considered in 2018-19.
- There is an increase in total factor productivity in 2018-19 with 1.017 tfpch or an increase of 1.7 percent out of which; firm no. 6 has the lowest tfpch with 0.510 or a decline in total factor productivity of 49 percent; on the other hand, firm no. 11 has the highest tfpch with 1.948 or an increase in total factor productivity by 94.8.
- In terms of Malmquist output-oriented index, Firm no. 3, 4, 5, 7, 9 and 10 show a decline in total factor productivity (tfpch) with 0.993, 0.947, 0.908, 0.905, 0.987 and 0.978 respectively. The firms need to increase their output by 0.7, 5.3, 9.2, 9.5, 1.3 and 2.2 percent respectively to achieve a total factor productivity of 1 in 2019-20.
- Other DMUs or firms (1, 2, 6, 8 and 11) exhibit an increase in total factor productivity in terms of Malmquist output-oriented index with 1.042, 1.235, 1.100, 1.014 and 1.819 respectively due to the changes in the variable considered in 2019-20.
- There is an increase in total factor productivity in 2019-20 with 1.062 tfpch or an increase of 6.2 percent out of which; firm no. 7 has the lowest tfpch with 0.905 or a

decline in total factor productivity of 9.5 percent mainly; on the other hand, firm no. 11 has the highest tfpch with 1.819 or an increase in total factor productivity by 81.9 percent due to an increase technical efficiency (techch).

- In terms of Malmquist output-oriented index, Firm no. 1, 3, 5, 6, 7, 8, 9, 10 and 11 show a decline in total factor productivity (tfpch) with 0.743, 0.741, 0.732, 0.966, 0.905, 0.642, 0.875, 0.443 and 0.283 respectively. The firms need to increase their output by 25.7, 25.9, 26.8, 3.4, 9.5, 35.8, 12.5, 56.7 and 71.7 percent respectively to achieve a total factor productivity of 1 in 2020-21.
- Few DMUs or firms (2 and 4) exhibit an increase in total factor productivity in terms of Malmquist output-oriented index with 1.297 and 1.228 respectively due to the changes in the variable considered in 2020-21.
- There is a decline in total factor productivity in 2020-21 with 0.746 tfpch or a decrease of 25.4 percent out of which; firm no. 11 has the lowest tfpch with 0.283 or a decline in total factor productivity of 71.7 percent; on the other hand, firm no. 2 has the highest tfpch with 1.297 or an increase in total factor productivity by 29.7 percent due to an increase in efficiency (effch), pure efficiency (pech) and scale efficiency (sech).
- The mean efficiency change (effch) during 2017-21 is 1.011, i.e., there is an average increase in efficiency of 1.1 percent; out of which the highest increase in efficiency is in firm no. 2 where effch increases by 28.5 percent while the lowest is firm no. 10 with a decrease in efficiency by 16.9 percent.
- The mean technical efficiency change (techch) during 2017-21 is 0.958, i.e., there is an average decrease in technical efficiency of 4.2 percent; out of which the firm with the highest increase in technical efficiency is firm no. 4 where techch increases by 8.6 percent while the lowest is firm no. 11 with a decrease in technical efficiency by 10.3 percent.
- The mean pure efficiency change (pech) during 2017-21 is 1.024, i.e., there is an average increase in pure efficiency of 2.4 percent; in which the highest increase in pure efficiency accrues to firm no. 2 where pech increases by 28.3 percent while the lowest is firm no. 10 with a decline in pure efficiency by 3.2 percent.

- The mean scale efficiency change (sech) during 2017-21 is 0.988, i.e., there is an average decrease in scale efficiency of 1.2 percent; in which the highest increase in scale efficiency is found in firm no. 11 where sech increases by 3.9 percent while the lowest is firm no. 10 with a decline in scale efficiency by 14.2 percent.
- The mean total factor productivity change (tfpch) during 2017-21 is 0.969, i.e., there is an average decrease in total factor productivity of 3.1 percent; in which the highest increase in total factor productivity among the firms is firm no. 2 where tfpch increases by 19.9 percent while the lowest is firm no. 10 with a decline in total factor productivity by 18.9 percent.
- DMUs or firms that shows an average decline in total factor productivity during 2017-21 are firm no. 1, 3, 5, 6, 7, 8, 10 and 11. Firm no. 1 due to decrease in technical efficiency change (0.942); firm no. 3 due to technical efficiency change (0.944); firm no. 5 due to technical efficiency change (0.931); firm no. 6 due to technical efficiency change (0.938); firm no. 7 due to technical efficiency change (0.931); firm no. 8 due to efficiency change (0.944), technical efficiency change (0.955) and scale efficiency change (0.944); firm no. 10 due to efficiency change (0.831), technical efficiency change (0.976), pure efficiency change (0.968) and scale efficiency change (0.858); and firm no. 11 due to technical efficiency change (0.897).
- DMUs or firms that shows an average increase in total factor productivity during 2017-21 are firm no. 2, 4 and 9. Firm no. 2 due to increase in efficiency change (1.285), pure efficiency change (1.283) and scale efficiency change (1.001); firm no. 4 due to efficiency change (1.010), technical efficiency change (1.086) and pure efficiency change (1.010); firm no. 9 due to efficiency change (1.034), technical efficiency change (1.020) and scale efficiency change (1.034).

On Comparison of Public and Private Hospitals' Performance in Mizoram

- Total patient care is much higher in public hospitals with a cumulative total of 3306896 while it is barely 1009138 cumulative total in private hospitals in out-patient department during 2016-21.

- Total patient care in out-patient department is highest in 2019-20 in public hospitals with 798216 total patient care and lowest in 2020-21 with 515663; while in private hospitals, total patient care is highest in 2019-20 with 211213 and lowest in 2020-21 with 181369.
- Total patient care in both public and private hospitals in out-patient department is highest in 2019-20 with 1014581 and lowest in 2020-21 with 697032. The cumulative total of public and private hospitals' total patient care in out-patient department is 4316034 between 2016 and 2021.
- Total patient care is much higher in public hospitals with a cumulative total of 462271 as compared to 336934 cumulative total in private hospitals in casualty or emergency department during 2016-21.
- Total patient care in casualty or emergency is highest in 2019-20 in public hospitals with 101485 total patient care and lowest in 2020-21 with 72476; while in private hospitals, total patient care is highest in 2019-20 with 89535 and lowest in 2016-17 with 44865.
- Total patient care in casualty or emergency department in both public and private hospitals is highest in 2019-20 with 191020 and lowest in 2020-21 with 697032. The cumulative total of public and private hospitals' total patient care is 4316034 between 2016 and 2021.
- Total admissions from OPD are almost similar with minimal differences in public and private hospitals with a cumulative total of 189792 and 183686 respectively during 2016-21. Total admission from OPD is highest in 2018-19 in public hospitals with 40395 and lowest in 2020-21 with 32087; while in private hospitals, total admission from OPD is highest in 2019-20 with 41798 and lowest in 2017-18 with 33805.
- Total admissions from OPD in both public and private hospitals are highest in 2019-20 with 81755 and lowest in 2020-21 with 66620. The cumulative total of public and private hospitals' total admissions from OPD is 373478 between 2016 and 2021.
- That total admissions from casualty are higher in private than public hospitals with a cumulative total of 58203 and 36591 respectively during 2016-21. Total admission from casualty is highest in 2018-19 in private hospitals with 14661 and lowest in

2020-21 with 9237; while in public hospitals, total admission from casualty is highest in 2017-18 with 8795 and lowest in 2019-20 with 6429.

- Total admissions from casualty in both public and private hospitals are highest in 2018-19 with 21783 and lowest in 2020-21 with 16179. The cumulative total of public and private hospitals' total admissions from casualty is 94794 between 2016 and 2021.
- Minor operations done are much higher in public than private hospitals with a cumulative total of 119254 and 35464 respectively during 2016-21. Total minor operations done is highest in 2016-17 in public hospitals with 28089 and lowest in 2020-21 with 15401; while in private hospitals, total minor operations done is highest in 2019-20 with 7883 and lowest in 2016-17 with 6086.
- Total minor operations done in both public and private hospitals are highest in 2018-19 with 34228 and lowest in 2020-21 with 23066. The cumulative total of public and private hospitals' total minor operations done is 154718 between 2016 and 2021.
- Major operations done are relatively higher in public than private hospitals with a cumulative total of 51995 and 40535 respectively during 2016-21. Total major operations done is highest in 2019-20 in public hospitals with 12166 and lowest in 2020-21 with 7855; while in private hospitals, total major operations done is highest in 2018-19 with 8877 and lowest in 2017-18 with 7659.
- Total major operations done in both public and private hospitals are highest in 2018-19 with 20494 and lowest in 2020-21 with 15960. The cumulative total of public and private hospitals' total major operations done is 92530 between 2016 and 2021.
- Male child delivery is higher in public than private hospitals with a cumulative total of 22872 and 10765 respectively during 2016-21. Total male child delivery is highest in 2019-20 in public hospitals with 4882 and lowest in 2020-21 with 4327; while in private hospitals, total male child delivery is highest in 2020-21 with 2538 and lowest in 2016-17 with 1946.
- Total male child delivery in both public and private hospitals is highest in 2019-20 with 7047 and lowest in 2016-17 with 6417. The cumulative total of public and private hospitals' total male child delivery is 33637 between 2016 and 2021.

- Female child delivery is higher in public than private hospitals with a cumulative total of 22540 and 10385 respectively during 2016-21. Total female child delivery is highest in 2019-20 in public hospitals with 4771 and lowest in 2020-21 with 4346; while in private hospitals, total female child delivery is highest in 2020-21 with 2357 and lowest in 2016-17 with 1906.
- Total female child delivery in both public and private hospitals is highest in 2019-20 with 6829 and lowest in 2016-17 with 1906. The cumulative total of public and private hospitals' total female child delivery is 32925 between 2016 and 2021.
- Male still birth is higher in public than private hospitals with a cumulative total of 216 and 76 respectively during 2016-21. Total male still birth is highest in 2016-17 in public hospitals with 61 and lowest in 2019-20 with 26; while in private hospitals, total male still birth is highest in 2019-20 and 2020-21 with 19 respectively and lowest in 2016-17 with 9.
- Total male still birth in both public and private hospitals is highest in 2016-17 with 70 and lowest in 2019-20 with 45. The cumulative total of public and private hospitals' total male still birth is 292 between 2016 and 2021.
- Female still birth is higher in public than private hospitals with a cumulative total of 188 and 63 respectively during 2016-21. Total female still birth is highest in 2017-18 in public hospitals with 48 and lowest in 2019-20 with 26; while in private hospitals, total female still birth is highest in 2018-19 with 17 and lowest in 2020-21 with 8.
- Total female still birth in both public and private hospitals is highest in 2016-17 with 59 and lowest in 2019-20 with 35. The cumulative total of public and private hospitals' total female still birth is 251 between 2016 and 2021.
- Live discharge is higher in private than public hospitals with a cumulative total of 227268 and 201988 respectively during 2016-21. Total live discharge is highest in 2018-19 in private hospitals with 48648 and lowest in 2020-21 with 40332; while in public hospitals, total live discharge is highest in 2017-18 with 42892 and lowest in 2020-21 with 32885.

- Total live discharge in both public and private hospitals is highest in 2018-19 with 91196 and lowest in 2020-21 with 73217. The cumulative total of public and private hospitals' total live discharge is 429256 between 2016 and 2021.
- Death discharge is higher in public than private hospitals with a cumulative total of 7158 and 6990 respectively during 2016-21. Total death discharge is highest in 2019-20 in public hospitals with 1536 and lowest in 2020-21 with 1271; while in private hospitals, total death discharge is highest in 2019-20 with 1456 and lowest in 2016-17 with 1393.
- Total death discharge in both public and private hospitals is highest in 2019-20 with 2992 and lowest in 2017-18 with 2621. The cumulative total of public and private hospitals' total death discharge is 14148 between 2016 and 2021.

On Demographic and Socio-economic Profile

- There are 194 males and 226 female respondents. Male constitutes 46.2 percent and Female 53.8 respectively. The age distribution shows that there are 40 respondents below the age of 18 or 9.5 percent; 197 respondents between the age of 19 and 40 which constitute 46.9 percent of the total respondents; 129 respondents of 41-60 age group with 30.7 percent out of the total respondents and 54 respondents above 60 with 12.9 percent.
- There are 35 respondents who are illiterate with 8.3 percent; 94 respondents who have elementary level of education with 22.4 percent; 190 respondents acquire high school or its equivalent diploma with 45.2 percent; and there are 101 or 24.0 percent who acquire bachelor's degree or above with regard to educational attainment.
- In terms of residential area, there are 174 or 41.2 percent who live in city area; 106 or 25.2 percent in district capitals; 40 or 9.5 percent in RD block towns; and 100 or 23.8 percent in villages. City Area has the highest number of respondents in terms of residential area followed by district capital, village and RD block towns.
- With regard to district-wise classification, there are 12 or 2.9 percent from Mamit district; 29 or 6.9 percent from Kolasib district; 243 or 57.9 percent from Aizawl district; 25 or 6.0 percent from Serchhip district; 18 or 4.3 percent from Champhai

district; 61 or 14.5 from Lunglei district; 17 or 4.0 percent from Siaha district; and 15 or 3.6 percent from Lawngtlai district.

- The occupational structure shows that there are 72 or 17.1 percent who are dependent; 67 or 16.0 percent who are unemployed; 51 or 12.1 percent who are agricultural workers; 76 or 18.1 percent who are daily wage earners; 25 or 6.0 percent who are corporate employee; 55 or 13.1 percent who are government employee; and 74 or 17.6 percent who are self-employed.
- The poverty status of the respondents shows that there are 58 or 13.8 percent who falls under AAY category; 146 or 34.8 percent in BPL category; and 216 or 51.4 percent in APL category. In terms of living conditions, there are 94 or 22.4 percent living in kutcha houses; 150 or 35.7 percent in semi-pucca houses; and 176 or 41.9 percent in pucca houses.
- Monthly income distribution shows that there are 78 or 18.6 percent below ₹10,000; 253 or 60.2 percent between ₹10,000-₹50,000; 76 or 18.1 percent between ₹50,000-₹100,000; and 13 or 3.1 Above ₹100,000.
- There are 150 respondents or 35.7 percent under chronic illness; 70 or 16.7 percent under viral infection; 113 or 26.9 percent under critical illness; 29 or 6.9 percent under delivery and child health; and 58 or 13.8 percent under accidental category.
- In terms of annual expenditure on healthcare, there are 160 respondents or 38.1 percent whose annual expenditure falls below ₹10,000; 112 or 26.7 percent between ₹10,000-₹30,000; 67 or 16.0 percent between ₹30,000-₹50,000; and 81 or 19.3 percent whose annual expenditure on healthcare is above ₹50,000.
- Families whose poverty status is in line with AAY category has relatively lower expenditure on healthcare as compared to BPL or AAY families such that only 1 family has had a healthcare expenditure above ₹50,000.
- Despite the relative difference in expenditure on healthcare based on poverty status, most of the respondents in all the three categories have an average expenditure on healthcare below ₹10,000 with 160 family count. Among BPL family, there are 38 families whose annual healthcare expenditure is above ₹50,000 which is relatively the highest among the three poverty status categories.

- In city area, district capitals and villages, chronic illness is the most common type of disease with 66, 35 and 38 respondents out of 174, 106 and 100 total respondents respectively. In RD block towns, the most prevalent disease type is critical illness with 14 respondents out of 40 total respondents.
- Chronic illness has the highest disease type across all types of residential area with 150 respondents falling under this category out of 420 total respondents; followed by critical illness, viral infections, accidental and delivery and child health with 113, 70, 58 and 29 respondents respectively.
- Among the male respondents, the most prevalent disease type is chronic illness with 66 respondents out of 194 total respondents followed by critical illness, accidental, viral infections and delivery and child health with 56, 35, 33 and 4 respectively.
- Also, the most prevalent disease type among female respondents is chronic illness with 84 respondents out of 226 total respondents followed by critical illness, viral infections, delivery and child health and accidental with 57, 37, 25 and 23 respectively.
- Among the AAY category city area has the highest count with 32 families followed by district capital, RD block town and villages with 12, 8 and 6 respectively.
- In BPL category, village category has the highest count with 61 families followed by city area, district capital and RD block towns with 48, 26 and 11 families respectively.
- With regard to APL category, city area has the highest count with 94 families followed by district capital, village and RD block town with 68, 33 and 21 families respectively.
- APL has the highest count with 216 families out of 420 across all categories of residential area followed by BPL and AAY with 146 and 58 respectively. Also, in city area, district capital and RD block town, the highest is APL category with 94, 68 and 21 out of 320 total families. On the other hand, in village category in terms of residential area, the highest count with regard to poverty status is BPL with 61 out of 100 total families.
- In city area and district capital, pucca houses have the highest count with 79 and 56 out of 174 and 106 families respectively. On the other hand, in village and RD block

town, semi-pucca houses have the highest count with 20 and 42 out of 40 and 100 families respectively.

- In terms of the total number of housing type across all residential areas, pucca houses has the highest count with 176 followed by semi-pucca and kutcha houses with 150 and 94 respectively out of a total of 420 respondents.
- In city area, pucca houses is the most common type of housing with 79 followed by semi-pucca and kutcha houses with 62 and 33 respectively out of a total of 174 respondents.
- Again, pucca houses is the most common type of housing in district capitals with 56 followed by semi-pucca and kutcha houses with 26 and 24 respectively out of a total of 106 respondents.
- However, in RD town, semi-pucca has the highest count with 20 followed by pucca and kutcha housing type with 11 and 9 respectively out of a total of 40 respondents.
- Similarly, villages have semi-pucca as the typical housing type with 42 followed by pucca and kutcha housing with 30 and 28 respectively out of a total of 100 respondents.

On Measurement of Service Quality

- Empathy dimension has the lowest negative service quality mean gap with a score of -0.703 followed by Responsiveness dimension with a gap score of -0.713, Assurance dimension with -0.862, Reliability dimension with -0.916 and Tangibles dimension with -0.975 respectively. Tangibles has the highest negative score and Empathy vice versa. The overall negative mean gap score in the five dimensions is -0.834.
- The lowest negative mean gap score in tangibles dimension is Q4 with -0.738 which relates to visual appearance of the hospital associated with services such as beds, notice boards, rooms, corridors, pamphlets, statements, bills, etc. The second lowest negative mean gap score is Q3 “Employees of the hospital are neat appearing” with -0.821. The third lowest negative mean gap score is Q1 “The Hospital has modern-looking, quality equipment” with -1.140. Finally, the highest negative mean gap score is Q2 “The infrastructures at the hospital are visually appealing” with -1.200.

- The lowest negative mean gap score in reliability dimension is Q5 with -0.745 which relates to the hospitals' acumen on striving for error free records. The second lowest negative mean gap score is Q6 "When patients have problem, the employees show sincere interest in solving it" with -0.879. The third lowest negative mean gap score is Q7 "The Hospital performs the service right the first time" with -0.948. The fourth lowest negative mean gap score is Q8 "The hospital provides their services at the time they promise to do so" with -0.995. Finally, the highest negative mean gap score is Q5 "When the hospital promises to do something by a certain time, they do so" with -1.012.
- The lowest negative mean gap score in assurance dimension is Q12 "Employees of the hospital are always willing to help patients" with -0.812. The second lowest negative mean gap score is Q11 "Employees of the hospital deliver prompt services to patients" with -0.824. The third lowest negative mean gap score is Q10 "Employees of the hospital inform patients exactly when services will be performed" with -0.848. Ultimately, the highest negative mean gap score is Q13 "Employees of the hospital are never too busy to respond to patient's requests" with -0.976. All negative mean gap scores in assurance dimension are below one-point scale.
- The lowest negative mean gap score in responsiveness dimension is Q18 "The hospital gives patients individual attention" with -0.334. The second lowest negative mean gap score is Q15 "Patients in the hospital feel safe in their transaction" with -0.719. The third lowest negative mean gap score is Q17 "Employees of the hospital are knowledgeable to patients' queries" with -0.805. The fourth lowest negative mean gap score is Q14 "The behaviour of employees of the hospital instill confidence in patients" with -0.848. Ultimately, the highest negative mean gap score is Q16 "Employees of the hospital are courteous (respectful) towards patients" with -0.862.
- The lowest negative mean gap score in empathy dimension is Q20 "The hospital has employees who give patients personal attention" with -0.552. The second lowest negative mean gap score is Q22 "The employees of the hospital understand the specific need of their patients" with -0.679. The third lowest negative mean gap score is Q19 "The hospital has operating hours convenient to all their patients" with -0.745.

Lastly, the highest negative mean gap score is Q21 “The hospital has the patients’ best interest at heart” with -0.838.

- The lowest negative mean gap score of tangibles dimension is Q4 “Materials associated with the services (such as pamphlet, sign/notice board etc.) are visually appealing” with a score of -0.738.
- The lowest negative mean gap score of reliability dimension is Q9 “The Hospital insists on error free records” with a score of -0.745. For assurance dimension, the lowest negative mean gap score is Q12 “Employees of the hospital are always willing to help patients” with a score of -0.812.
- With regard to responsiveness dimension, the lowest negative mean gap score is Q18 “The Hospital gives patients individual attention” with a score of -0.334. Ultimately in empathy dimension, the lowest negative gap score is Q20 “The Hospital has employees who give patients personal attention” with a score of -0.552.
- The lowest negative mean gap score among the five SERVQUAL dimensions is responsiveness with a score of -0.334.
- The highest negative mean gap score of tangibles dimension is Q2 “The infrastructures of the hospital are visually appealing” with a score of -1.200.
- The highest negative mean gap score of reliability dimension is Q5 “When the Hospital promises to do something by a certain time, they do so” with a score of -1.012.
- For assurance dimension, the highest negative mean gap score is Q13 “Employees of the hospital are never too busy to respond to patient’s requests” with a score of -0.976.
- With regard to responsiveness dimension, the highest negative mean gap score is Q16 “Employees of the Hospital are courteous (respectful) towards patients” with a score of -0.862.
- Ultimately in empathy dimension, the highest negative mean gap score is Q21 “The Hospital has the patients’ best interest at heart” with a score of -0.838.
- The highest negative mean gap score among the five SERVQUAL dimensions is tangibles with a score of -1.200.

- With regard to SERVQUAL score in various districts of Mizoram, the lowest negative mean gap score is attained by District Hospital, Lawngtlai with a score of -0.403 followed by Civil Hospital, Lunglei; District Hospital, Kolasib; District Hospital, Mamit and Civil Hospital, Aizawl with a score of -0.695, -0.758, -0.814 and -0.898 respectively.
- There are three districts with a negative SERVQUAL gap score of greater than -1, viz., District Hospital, Serchhip with a score of -1.306 followed by District Hospital, Champhai and District Hospital, Siaha with a score of -1.306 and -2.264 respectively. Among these three districts, District Hospital, Siaha has the highest negative mean gap score of -2.264.
- The highest mean gap score in Tangible is achieved by District Hospital, Lawngtlai with a score of 0.033 followed by District Hospital, Kolasib; Civil Hospital, Lunglei; District Hospital, Mamit and District Hospital, Champhai have a low negative score of -0.871, -0.926, -0.958, -0.986 respectively.
- Only District Hospital, Lawngtlai has a positive mean gap score in Tangible dimension across all other hospitals in various districts of Mizoram with a score of 0.033.
- There are three districts with a negative Tangible gap score of greater than -1, viz., District Hospital, Serchhip with a score of -1.457 followed by District Hospital, Siaha and Civil Hospital, Aizawl with a score of -1.162 and -1.042 respectively. Among these three districts, District Hospital, Serchhip has the highest negative mean gap score of -1.457.
- The lowest negative mean gap score in Reliability is achieved by District Hospital, Lawngtlai with a score of -0.080 followed by Civil Hospital, Lunglei; Civil Hospital, Aizawl; District Hospital, Kolasib with a score of -0.610, -0.835 and -0.959 respectively.
- There are four districts with a negative Tangible gap score of greater than -1, viz., District Hospital, Siaha with a score of -2.930 followed by District Hospital, Champhai; District Hospital, Serchhip; and District Hospital, Mamit with a score of -1.667, -1.243 and -1.217 respectively.

- The lowest negative mean gap score in Assurance is achieved by District Hospital, Lawngtlai with a score of -0.184 followed by Civil Hospital, Lunglei; District Hospital, Mamit; Civil Hospital, Aizawl and District Hospital, Kolasib with a socre of -0.677, -0.708, -0.804, -0.922 respectively.
- There are three districts with a negative Assurance gap score of greater than -1, viz., District Hospital, Siaha with a score of -2.232 followed by District Hospital, Champhai and District Hospital, Serchhip with a score of -1.556 and -1.286 respectively.
- The lowest negative mean gap score in Responsiveness is achieved by District Hospital, Mamit with a score of -0.533 followed by Civil Hospital, Aizawl; Civil Hospital, Lunglei; District Hospital, Lawngtlai and District Hospital, Kolasib with a score of -0.565, -0.692, -0.773, -0.848 respectively.
- Meanwhile, there are three districts with a negative Responsiveness gap score of more than -1, viz., District Hospital, Siaha with a score of -2.647 followed by District Hospital, Serchhip and District Hospital, Champhai with a score of -1.278 and -1.022 respectively.
- The lowest negative mean gap score in Empathy is achieved by Civil Hospital, Aizawl with a score of -0.575 followed by Civil Hospital, Lunglei; District Hospital, Mamit; District Hospital, Lawngtlai and District Hospital, Kolasib with a score of -0.594, -0.625, -0.850, -0.888 respectively.
- On the other hand, there are three districts with a negative Empathy gap score of more than -1, viz., District Hospital, Siaha with a score of -2.000 followed by District Hospital, Champhai and District Hospital, Serchhip with a score of -1.389 and -1.282 respectively.

On Brief Analysis of Income Inequality

- The Gini Index among the 420 public healthcare beneficiaries is 0.474 which shows that income inequality is moderately low.

On Testing of Various Hypotheses

- The reliability statistics or Cronbach's Alpha α of various dimensions and parameters being employed in the analysis of patients' satisfaction have α value greater than 0.8 which shows that the data are reliable for further statical tests.
- The KMO and Bartlett test of sampling adequacy shows that the KMO value is greater than 0.5, i.e., 0.935 which shows that the sample size is adequate for factor analysis and other statistical tests. Also, Bartlett's measure tests the null hypothesis that the correlation matrix is an identity matrix and a significant test with *(p<0.000)* is found.
- The Kolmogorov-Smirnov test shows that the test is significant across all dimensions and parameters with *(p<0.000).* Also, the Shapiro-Wilk test shows similar results with *(P<0.000).* This implies that the data are not normally distributed.
- An independent samples *Mann-Whitney U test* is used to examine whether the distribution of tangible dimension is the same across all categories of overall satisfaction. No significant result was found *(U=3.855, p>0.05, i.e., 0.175)*. Hence, the null hypothesis is retained.
- In reliability dimension, the *Mann-Whitney U test* shows a significant result, i.e., *(U=6.074, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of reliability dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 32.88 while patients who are satisfied scored a mean rank of 217.53. This shows that reliability dimension plays a crucial role in patients' overall satisfaction.
- *Mann-Whitney U test* in assurance dimension gives a significant result, i.e., *(U=5.700, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of assurance dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 56.22 while patients who are satisfied scored a mean rank of 216.61.

This shows that assurance dimension plays a crucial role in patients' overall satisfaction.

- Again, with regard to responsiveness dimension, the independent samples *Mann-Whitney U test* gives a significant result, i.e., *(U=6.049, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of responsiveness dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 34.41 while patients who are satisfied scored a mean rank of 217.47. This shows that responsiveness dimension plays an important role in patients' overall satisfaction.
- Also, an independent samples *Mann-Whitney U test* is used to examine whether the distribution of empathy dimension is the same across all categories of overall satisfaction. A significant result was found *(U=6.245, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of empathy dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 22.16 while patients who are satisfied scored a mean rank of 217.96. This shows that empathy dimension plays an important role in patients' overall satisfaction.
- Finally in word-of-mouth *Kruskal-Wallis test* is employed. It shows a significant result of *(H(6)=1.590, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of word-of-mouth dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 41.38 while patients who are satisfied scored a mean rank of 217.20. This shows that word-of-mouth, i.e., negative or positive commends from others play an important role in patients' overall satisfaction and making use of public hospitals' services.
- An independent samples *Kruskal-Wallis test* is used to examine whether the distribution of overall satisfaction is the same across categories of residential area. A

significant result was found *(H(3)=24.079, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of satisfaction with regard to the residential area of patients. This indicates that patients' overall satisfaction across various residential areas differ. Follow-up pairwise comparison indicated that patients from RD Block town are more inclined to be satisfied with the healthcare services being provided by public hospitals as compared to other residential areas.

- *Kruskal-Wallis test* of independent sample is used to examine whether the distribution of overall satisfaction is the same across categories of various district. A significant result was found *(H(7)=95.253, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of satisfaction with regard to various district of patients. This indicates that patients' overall satisfaction across various districts differ. Follow-up pairwise comparison indicated that patients from Lawngtlai district are more inclined to be satisfied with the healthcare services being provided by public hospitals as compared to other districts.
- An independent samples *Kruskal-Wallis test* is used to examine whether the distribution of overall satisfaction is the same across categories of educational qualification. An insignificant result was found *(H(3)=1.901, p>0.05, i.e., 0.593)*. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on educational qualification, i.e., patients' overall satisfaction is not influenced by educational qualification.
- With regard to income distribution and overall satisfaction, an independent samples *Kruskal-Wallis test* is used. An insignificant result was found *(H(3)=0.636, p>0.05, i.e., 0.888)*. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on income, i.e., patients' overall satisfaction is not influenced by monetary income.
- Also, to highlight the relationship between poverty status and overall satisfaction, an independent samples *Kruskal-Wallis test* is employed. An insignificant result was found *(H(2)=0.888, p>0.05, i.e., 0.641)*. Hence the null hypothesis is accepted and

there is no significant difference in overall satisfaction based on poverty status, i.e., patients' overall satisfaction is not influenced by monetary income.

- The *Mann-Whitney U test* an insignificant result, i.e., *(U=22.562, p>0.05, i.e., 0.571)* with regard to the relationship between gender and overall satisfaction. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on gender, i.e., patients' overall satisfaction is not influenced by gender.
- Finally, *Kruskal-Wallis test* shows that there is an insignificant result in the analysis of the relationship between occupation and overall satisfaction with *(H(6)=6.451, p>0.05, i.e., 0.375)*. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on occupation, i.e., patients' overall satisfaction is not influenced by the means through which they earn their livelihood.

RECOMMENDATIONS

Empirical based recommendations

- There is a widespread regional inequality in terms of infrastructure across various public hospitals in Mizoram. There should be a proper framework that cater to equitable distribution of resources that are necessary for ensuring the provision of good and quality healthcare services.
- In order to increase productivity and efficiency, public hospitals should ensure effective redistribution of manpower and other facilities that are required for effective healthcare provision. It can be seen from the analysis that some public hospitals do not achieve technical efficiency (*te*) due to decrease in manpower and other facilities required for impeccable provision of healthcare services.
- The lowest negative mean gap score among the five SERVQUAL dimensions is responsiveness. There is a room for further improvement in the interpersonal domains of responsiveness without extravagant expenditures by the hospitals staff. The staff must improve their responsiveness in improving their service delivery based on patient expectations. Timely and effective communication to patients can help reduce their anxiety as well as of their family members.

- Based on the findings of the tangible quality of the hospitals under study, it is strongly recommended to ensure that the staff in the hospitals should be professionally dressed. Quality meals should be prepared and patients must have choices in the menu during treatments. And the location of the hospitals should be easily accessible and convenient. Moreover, facilities such as medical equipment and machines are in a dilapidated state in most of the Public Hospitals under study which desperately need renovation and improvement. This can be done by allocating more untied funds from the Government through various schemes or programs that will address and implement the needful with regard to proper maintenance of this quintessential public good.
- Much of the discontent with regard to healthcare provision by public hospitals can be attributed to negligence and post-hospitalization services. For the improvement of the reliability of the hospitals it is suggested here that they must prevent operational and functional breakdowns, identify failure when it occurs and intercede before harm is caused or mitigate the harm caused by failures that are not detected or intercepted. And to further redesign the process based on the critical failures identified.
- The vital role plays by sympathy and understanding toward patients should be reiterated to healthcare professionals. Besides medical treatment, patients need reassurance and peace of mind throughout their recuperation period which can have positive effect on their overall well-being. It should be in the heart of healthcare professionals to be courteous and considerate towards their patients. Capacity building through workshops or conference with clinical psychologists or social workers would lead to a favourable outcome towards improvement in Empathy dimension.
- Political will plays an important role with regard to efficient and effective public healthcare provision. It can be seen that the existing Public Hospitals have been quite indispensable for the general public in terms of monetary welfare provision and other basic healthcare needs. The Government should ensure their smooth functioning by allocating more resources to public healthcare services.

General recommendations

- Robust feedback and grievance redressal should be set up by the hospitals to take swift actions. The Government or directorate responsible for supervision should establish a formal redressal cell that can be availed through online as well as offline mode.
- Also, more information pertaining to the type of healthcare services and other necessary prerequisites should be duly updated on the websites maintained by the directorate. This will ensure free flow of information which plays a pivotal role in the provision of quality healthcare services.
- There is shortage of trained and skill doctors, nurses, technicians and other medical staff, because of this they are performing an overlapping role which reduce the amount of time they can devote for their patients. This reduces their reliabilities as seen in the gap score of the reliability test. It is therefore recommended that the hospitals must be enhanced in terms of trained and skill health care providers. It is further suggested here that the Government should spend more on public health care, since higher wages will attract a greater number of skilled manpower. Higher government spending will also enable hospitals to acquire better medical supplies and equipment. A quantum increase in budget allocation on health care is the need of the hour in Mizoram in particular and India as a whole.
- In India, Health care became a profitable venture for private players. There is no compulsion from the Government to get an accreditation for small entrants, this leads to mushroom growth of small clinics without proper quality control. They do not have to provide any minimum quality, yet they flourish because they are affordable. People too are neither aware of the quality parameters nor bothered about it. They consult whichever is cheap. It is therefore, suggested here that the state Government must regulate and monitor these private entrants for better medical facilities.

CONCLUSION

Despite the widespread misconception and malcontent towards Public Hospitals' services, the role that they play towards the provision of affordable and quality healthcare services cannot be overlooked. Since access to healthcare is one of the basic fundamental rights of each and every citizen of India; and to realize the welfare state, there is a desperate need to restructure, innovate and upgrade our healthcare infrastructure before it becomes a privilege for few sections of our society who afford private healthcare services. This research shows, despite many shortcomings, that the state of Mizoram has been utilizing its public healthcare services decently, albeit many constraints that would always require collective responsibility among the various stakeholders of our burgeoning democracy.

APPENDICES

APPENDIX-I

DETERMINATION OF SAMPLE SIZE

Taro Yamane formula is used for determining the sample size of the primary survey conducted in this research. The sampling is based on the population of 2018-19 hospital census (i.e., a year before the Covid19 pandemic or the median year during the study period). Moreover, only district level hospitals are taken into consideration since only district level healthcare centres qualify as to be deemed 'Public Hospitals' under the auspice of the Government of Mizoram. The formula for calculation of the sample size is given as–

$$n = N/1 + N(e^2)$$

Where n is the sample size; N is the estimated population size which is 820,991; *e* is the allowable error of 5 percent (0.05); and 1 is the constant. Our sample size can be calculated as follows:

$$n = 820{,}991/1 + 820{,}991(0.05)^2$$

$$n = 419.9 \cong 420$$

For various districts, each proportion is worked out from respective population as:

$$N \times {}^{n}/_{\overline{N}}$$

Where N is the estimated population size, n is the sample size and $\overline{N}$ is the district population. The following table shows the sample size for each district:

Determination of Sample Size			
Sl. No.	***Name of the District***	***Total Patient Population in 2018-19***	***Sample Size***
1	Aizawl District	524468	243
2	Lunglei District	98381	61
3	Champhai District	35901	18
4	Serchhip District	37985	25
5	Siaha District	24487	17
6	Kolasib District	48343	29
7	Mamit District	21617	12
8	Lawngtlai District	29809	15
Total		**820991**	**420**

APPENDIX-II

INTERVIEW SCHEDULE

A. Socio-economic and Other Demographic Indicators

Sl. No.	*Particulars*
1	Name
2	Department Consulted *(i) OPD (ii) IPD (iii) Casualty*
3	Address *(i) City Area (ii) District Capital (iii) RD Block (iv) Village*
4	District *(i) Aizawl (ii) Lunglei (iii) Champhai (iv) Serchhip (v) Siaha (vi) Kolasib (vii) Mamit (viii) Lawngtlai*
5	Age
6	Gender *(i) Male (ii) Female*
7	Educational Qualification *(i) Graduate & Above (ii) High School/Diploma (iii) Elementary (iv) Illiterate*
8	Disease or problem *(i) Viral infections (ii) Critical illness (iv) Chronic (v) Accidental (vi) Delivery & child health*
9	Occupation *(i) Govt. employee (ii) Corporate (iii) Self-employed (iv) Daily labourer (v) Agricultural worker (vi) Dependent (vii) Unemployed*
10	Monthly income of the family
11	Ration Card *(i) Green (ii) Yellow (iii) White*
12	Housing type *(i) Pucca (ii) Semi-pucca (iii) Kutcha*
13	Family's annual expenditure on healthcare *(i) Below 10000 (ii) 10000-30000 (iii) 30000-50000 (iv) Above 50000*
14	Post-hospital visits spending during the past one year *(i) Below 1000 (ii) 1000-5000 (iii) 5000-10000 (iv) Above 10000*

B. Perception (P) and Expectation (E) of SERVQUAL Dimension

Sl. No.	*Particulars*
Q1.	The Hospital has modern-looking, quality equipment
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q2.	The infrastructures at the hospital are visually appealing
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q3.	Employees of the hospital are neat appearing
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q4.	Materials associated with the services of the hospital are visually appealing
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q5.	When the hospital promises to do something by a certain time, they do so
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q6.	When patients have problems, employees show sincere interest in solving it
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q7.	The hospital performs the service right the first time
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q8.	The hospital provides their services at the time they promise to do so
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q9.	The hospital insists on error free records
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q10.	Employees inform patients exactly when a service will be performed
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q11.	Employees deliver prompt services to patients
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q12.	Employees are always willing to help patients
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
E	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q13.	Employees are never too busy to respong to patients' requests
P	*(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

E *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

Q14. The behaviour of employees instill confidence in patients

P *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

E *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

Q15. Patients feel safe in their transactions

P *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

E *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

Q16. Employees are courteous (respectful) towards patients

P *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

E *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

Q17. Employees are knowledgeable to patients' queries

P *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

E *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

Q18. The hospital gives patients individual attention

P *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

E *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

Q19. The hospital has operating hours convenient to all their patients

P *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

E *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

Q20. The hospital has employees who give personal attention to patients

P *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

E *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

Q21. The hospital has the patients' best interest at heart

P *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

E *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

Q22. The employees understand specific needs of their patients

P *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

E *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

$1 =$ Very strongly disagree; $2 =$ strongly disagree; $3 =$ Disagree; $4 =$ Neutral; $5 =$ Agree; $6 =$ Strongly agree; $7 =$ Very strongly agree

C. Overall Satisfaction of Patients

Sl. No. ***Particulars***

Q1. I am satisfied with the healthcare services provided by the staff of the hospital

(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7

Q2. I am satisfied with other services provided by the hospital

(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7

$1 =$ Very strongly disagree; $2 =$ strongly disagree; $3 =$ Disagree; $4 =$ Neutral; $5 =$ Agree; $6 =$ Strongly agree; $7 =$ Very strongly agree

D. Word-of-mouth

Sl. No.	*Particulars*
Q1.	How likely are you to say positive things about the hospital to others? *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q2.	How likely are you to recommend the hospital to someone who seeks your advice? *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*
Q3.	How likely are you to encourage others to choose the hospital when they require healthcare services? *(i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) 6 (vii) 7*

$\mathbf{1 = Not\ at\ all\ likely; 2 = Unlikely; 3 = Slightly\ unlikely; 4 = Neutral; 5 = Slightly\ likely;}$
$\mathbf{6 = Likely; 7 = Extremely\ likely}$

APPENDIX-III

THEORETICAL FRAMEWORK OF MALMQUIST PRODUCTIVITY INDEX

To measure productivity, it is assumed that a hospital produces output y^t using input x^t. The production set H_t that models the transformation of inputs $x^t \in \mathfrak{R}_+^N$ into outputs $y^t \in \mathfrak{R}_+^N$ at time *t* is:

$$H^t = [(x^t, y^t : x^t can\ produce\ y^t]$$

Following Shephard (1970), the output distance function for a firm at *t* is:

$$D_0^t(x^t, y^t) = inf\ [\theta : (x^t, y_t/\theta) \epsilon H^t \qquad (1)$$

Note that $D^t(x^t, y^t \leq 1$ if and only if $(x^t, y^t) \in H^t$. In addition, $D_0^t(x^t, y^t) = 1$ if and only if (x^t, y^t) is on the boundary or frontier technology. In the terminology of Farell (1957), that occurs when production is technically efficient.

Defining the MPI requires us to define the distance function with respect to two different time periods, such as:

$$D_0^t(x^{t+1}, y^{t+1}) = \inf [\theta : (x^{t+1}, y^{t+1}/\theta) \in H^t] \qquad (2)$$

and:

$$D_0^{t+1}(x^t, y^t) = \inf [\theta : (x^t, y^t/\theta) \epsilon H^{t+1} \qquad (3)$$

The first distance function, equation *(2)*, measures the maximum proportional change in outputs required to make (x^{t+1}, y^{t+1}) feasible in relation to the technology at the previous period *t*. Similarly, the second mixed-period distance function, equation *(3)*, measures the maximum proportional change in output required to make (x^t, y^t) feasible in relation to the technology at *t+1*, which is called $D_0^{t+1}(x^t, y^t)$.

Using the above distance function Caves *et al.* (1982) defined output-oriented MPI relative to a single technology at *t* as:

$$M_0^t = \frac{D_0^t(x^{t+1}, y^{t+1})}{D_0^t(x^t, y^t)} \qquad (4)$$

and for *t+1* as:

$$M_0^{t+1} = \frac{D_0^{t+1}(x^{t+1},y^{t+1})}{D_0^{t+1}(x^t,y^t)} \qquad (5)$$

Fare *et al.* (1989, 1994a) employed the geometric mean of the two output-based Malmquist indices defined above to yield the following Malmquist-type measure of productivity:

$$M_0^t = (x^{t+1}, y^{t+1}, x^t . y^t) = [\frac{D_0^t(x^{t+1},y^{t+1})}{D_0^t(x^t,y^t)} \frac{D_0^{t+1}(x^{t+1},y^{t+1})}{D_0^{t+1}(x^t,y^t)}]^{1}/_{2} \qquad (6)$$

This productivity index is the geometric mean of a pair of ratios of output distance functions. The first ratio compares the data from periods *t* and *t+1* relative to production possibilities existing in period *t*, and the second compares the performance of the same data relative to production possibilities existing in period *t+1*.

In the spirit of Nishimizu and Page (1982), Fare *et al.* (1989, 1994a) expressed the above Malmquist output-based productivity index in an equivalent way:

$$M_0^t = (x^{t+1}, y^{t+1}, x^t, y^t) = \frac{D_0^{t+1}(x^{t+1},y^{t+1})}{D_0^t(x^t,y^t)} \ [\frac{D_0^t(x^{t+1},y^{t+1})}{D_0^{t+1}(x^{t+1},y^{t+1})} \frac{D_0^t(x^t,y^t)}{D_0^{t+1}(x^t,y^t)}]^{1}/_{2} \qquad (7)$$

Where the ratio outside the bracket measures the change in the output-oriented measures of Farrell technical efficiency between years *t* and *t+1*. The geometric mean of the two ratios inside the bracket captures the technical progress as measured by the shift in the frontier between the two periods evaluated at the input level x^{t+1} and at the input level realized at x^t.

The two terms in equation *(7)* correspond to

Efficiency change (ECH)= $\frac{D_0^{t+1}(x^{t+1},y^{t+1})}{D_0^t(x^t,y^t)}$, *(7.1)*

Technological change (TCH)= $[\frac{D_0^t(x^{t+1},y^{t+1})}{D_0^{t+1}(x^{t+1},y^{t+1})} \frac{D_0^t(x^t,y^t)}{D_0^{t+1}(x^t,y^t)}]^{1}/_{2}$ *(7.2)*

The efficiency change term is equivalent to the ratio of the Farell technical efficiency in period *t+1* divided by the Farell technical efficiency in period *t*. The technological change

term is the geometric mean of the shift in technology as observed at x^{t+1} (the first ratio inside the bracket) and the shift in technology observed at x^{t} (the second ratio inside the bracket).

The efficiency change component is an index of relative technical efficiency change, and shows how much closer (or farther away) a firm gets to the "best practice" frontier. This component is greater than, equal to, or less than unity depending on whether the evaluated firm improves, stagnates, or declines. The technological change component measures how much the frontier shifts, and indicates whether the best practice frontier, against which the evaluated firm is compared is itself improving, stagnating, or deteriorating. Depending on the case, the index will take a value greater than, equal to, or less than unity – hence technological change would be positive, zero, or negative.

Where variable returns to scale (VRS) exist, it is possible to further decompose the ECH into two elements: that due to pure efficiency change (PEC) and that due to scale efficiency change (SEC):

$$\text{ECH}= \frac{D_0^{t+1}(x^{t+1},y^{t+1})}{D_0^{t}(x^{t},y^{t})} = \frac{D_{VRS}^{t+1}(x^{t+1},y^{t+1})}{D_{VRS}^{t}(x^{t},y^{t})} \frac{\frac{D_{CRS}^{t+1}(x^{t+1},y^{t+1})}{D_{VRS}^{t+1}(x^{t+1},y^{t+1})}}{\frac{D_{CRS}^{t}(x^{t},y^{t})}{D_{VRS}^{t}(x^{t},y^{t})}} \qquad (8)$$

That is, ECH= PEC *X* SEC.

The first expression reflects the change in efficiency relative to the true VRS frontier, i.e., the proportional reduction in input usage if inputs were not wasted and the second expression reflects the extent to which the distance from the scale-efficient point on the VRS frontier (relative to the constant returns to scale (CRS) frontier) has changed, i.e., the reduction in input usage that occurs in the presence of CRS (scale efficiency). Again, if PEC is greater than 1, it reflects efficiency gain, in that the hospital is closer to the VRS frontier in period *t*; the opposite holds true for a value of PEC less than 1. A value of SEC greater than 1 implies the hospital has become more scale-efficient between the two periods.

The application of DEA to the Malmquist productivity index requires the solution of the following linear programming (LP) problems equations {*(9)-(12)*}, corresponding to the

four required distance functions in equation *(6)*, for each pair of the N hospitals under investigation, and in each pair of adjacent time periods *t* and *t+1* (Coelli *et al*., 2005):

$$[D_0^{t+1}(x^{t+1}, y^{t+1})]^{-1} = \frac{max}{\theta,\lambda}\theta, \qquad (9)$$

subject to:

$$-\theta y_0^{t+1} + Y^{t+1}\lambda \geq 0,$$

$$x_0^{t+1} - X^{t+1}\lambda \geq 0,$$

$$\lambda \geq 0,$$

where x_0 and y_0 are the vectors of inputs and outputs, respectively, associated with hospital$_0$ and λ is a flexible vector of weights to be applied to the matrices *X and Y*. The three other linear programming problems are variations of–

$$[D_0^{t}(x^{t}, y^{t})]^{-1} = \frac{max}{\theta,\lambda}\theta, \qquad (10)$$

subject to:

$$-\theta y_0^{t} + Y^{t}\lambda \geq 0,$$

$$x_0^{t} - X^{t}\lambda \geq 0,$$

$$\lambda \geq 0,$$

$$[D_0^{t+1}(x^{t}, y^{t})]^{-1} = \frac{max}{\theta,\lambda}\theta, \qquad (11)$$

subject to:

$$-\theta y_0^{t} + Y^{t+1}\lambda \geq 0,$$

$$x_0^{t} - X^{t+1}\lambda \geq 0,$$

$$\lambda \geq 0,$$

$$[D_0^t(x^{t+1}, y^{t+1})]^{-1} = \frac{max}{\theta,\lambda}\theta, \qquad (12)$$

$$-\theta y_0^{t+1} + Y^t\lambda \geq 0,$$

$$x_0^{t+1} - X^t\lambda \geq 0,$$

$$\lambda \geq 0,$$

Decomposing the technical efficiency change into scale efficiency change and pure efficiency change components requires the solution of two additional LPs (when comparing two production points). These would involve repeating equations *(9)* and *(10)* with a convexity restriction ($N1'\lambda = 1$) added to each. That is, one would calculate these two distance functions relative to a variable returns to scale (VRS) technology instead of a CRS technology.

The following table shows the input-output variables for the calculation of Malmquist Productivity Index (MPI):

Malmquist Input-output Data for 2016-17								
Sl. No.	***Name of the Hospital***	***Doctors***	***Nurses***	***Technicians***	***OPD***	***Discharge***	***Operations***	***Investigations***
1	Civil Hospital, Aizawl	82	136	31	416566	2160	18465	895095
2	Kulikawn Hospital	16	31	3	11070	1217	96	9826
3	Civil Hospital, Lunglei	26	53	10	88402	7020	5527	60473
4	District Hospital, Champhai	15	34	6	24980	2530	322	11771
5	District Hospital, Serchhip	11	33	6	28703	1998	1967	15466
6	District Hospital, Siaha	10	25	2	26556	3417	778	9127
7	District Hospital, Kolasib	14	34	6	43137	3756	2938	32150
8	District Hospital, Mamit	8	20	5	17210	1442	1519	4689
9	District Hospital, Lawngtlai	11	21	2	18179	1825	461	5146
10	Regional Cancer Centre	14	22	7	9877	1294	0	27250
11	Referral Hospital, Falkawn	40	91	36	33703	4987	5987	18273
	Total	247	500	114	718383	31646	38060	1089266

Source: Field Survey, 2022

Malmquist Input-output Data for 2017-18								
Sl. No.	***Name of the Hospital***	***Doctors***	***Nurses***	***Technicians***	***OPD***	***Discharge***	***Operations***	***Investigations***
1	Civil Hospital, Aizawl	83	164	34	388482	14369	17229	710725
2	Kulikawn Hospital	16	38	4	11778	1148	78	8750
3	Civil Hospital, Lunglei	48	79	11	89827	6335	5357	77458
4	District Hospital, Champhai	29	52	7	32027	2683	595	14936
5	District Hospital, Serchhip	21	48	7	31969	2452	2585	32448
6	District Hospital, Siaha	19	35	3	30252	3172	866	8397
7	District Hospital, Kolasib	27	47	7	44949	3988	3046	34484
8	District Hospital, Mamit	14	35	6	19657	1612	149	4564
9	District Hospital, Lawngtlai	21	32	3	26144	1606	801	11010
10	Regional Cancer Centre	14	27	7	12018	1606	0	30369
11	Referral Hospital, Falkawn	45	109	38	54850	5273	4995	55559
	Total	337	666	127	741953	44244	35701	988700

Source: Field Survey, 2022

Malmquist Input-output Data for 2018-19								
Sl. No.	***Name of the Hospital***	***Doctors***	***Nurses***	***Technicians***	***OPD***	***Discharge***	***Operations***	***Investigations***
1	Civil Hospital, Aizawl	87	204	74	394971	13649	17727	907021
2	Kulikawn Hospital	17	44	14	17199	1246	116	12508
3	Civil Hospital, Lunglei	40	104	26	98381	5499	5238	83301
4	District Hospital, Champhai	33	92	21	35901	2863	631	15855
5	District Hospital, Serchhip	24	83	13	37985	2482	2813	40881
6	District Hospital, Siaha	21	67	7	24487	1962	819	8395
7	District Hospital, Kolasib	27	61	16	48343	4108	2112	35703
8	District Hospital, Mamit	18	56	12	21617	1683	576	7384
9	District Hospital, Lawngtlai	22	48	7	29809	1813	563	15540
10	Regional Cancer Centre	14	34	12	11953	1244	0	33701
11	Referral Hospital, Falkawn	48	144	57	100345	7515	7306	230740
	Total	351	937	259	820991	44064	37901	1391029

Source: Field Survey, 2022

Malmquist Input-output Data for 2019-20								
Sl. No.	***Name of the Hospital***	***Doctors***	***Nurses***	***Technicians***	***OPD***	***Discharge***	***Operations***	***Investigations***
1	Civil Hospital, Aizawl	87	195	74	447060	14000	16236	1016651
2	Kulikawn Hospital	17	39	14	20195	1222	59	10095
3	Civil Hospital, Lunglei	40	98	26	115248	4799	3428	119496
4	District Hospital, Champhai	33	87	21	33593	2769	744	32191
5	District Hospital, Serchhip	24	78	13	35971	2262	2637	39129
6	District Hospital, Siaha	22	61	8	30062	1978	1080	9920
7	District Hospital, Kolasib	27	56	16	48390	4060	2191	40712
8	District Hospital, Mamit	18	51	13	23859	1885	129	11445
9	District Hospital, Lawngtlai	22	44	8	27517	1918	401	14635
10	Regional Cancer Centre	14	31	12	11331	1237	0	36418
11	Referral Hospital, Falkawn	48	137	57	106475	7096	9197	265544
	Total	352	877	262	899701	43226	36102	1596236

Source: Field Survey, 2022

Malmquist Input-output Data for 2020-21								
Sl. No.	***Name of the Hospital***	***Doctors***	***Nurses***	***Technicians***	***OPD***	***Discharge***	***Operations***	***Investigations***
1	Civil Hospital, Aizawl	87	201	74	304518	12871	12191	862145
2	Kulikawn Hospital	17	37	14	13611	777	1613	8061
3	Civil Hospital, Lunglei	40	102	26	83445	3877	2850	120824
4	District Hospital, Champhai	33	91	21	42115	4425	866	46810
5	District Hospital, Serchhip	24	79	13	25382	1934	1967	43446
6	District Hospital, Siaha	22	63	10	24079	2355	886	10528
7	District Hospital, Kolasib	27	58	16	34262	3329	2036	34254
8	District Hospital, Mamit	18	52	14	17357	1386	407	12253
9	District Hospital, Lawngtlai	22	45	9	20633	1564	321	9269
10	Regional Cancer Centre	14	31	12	8632	164	51	25262
11	Referral Hospital, Falkawn	48	142	57	14105	1474	68	73090
	Total	352	901	266	588139	34156	23256	1245942

Source: Field Survey, 2022

APPENDIX-IV
THEORETICAL FRAMEWORK AND CALCULATION OF GINI INDEX

The Gini has a natural geometric interpretation as 1 minus twice the area between the Lorenz curve and the diagonal line representing perfect equality. Stuart (1954), shows that the only information required for the Gini of any variable is its mean, the sample (or population) size, and the covariance between the variable and the rank of the variable.

The basic derivation for the absolute Gini is:

$$A = \int_a^b F(y)[1 - F(y)]dy, \qquad (1)$$

where *A* is half of Gini's expected mean difference, *a* is the lowest and *b* is the highest value of the variable *y*, and *F(y)* is the cumulative distribution of *y*. Using integration by parts, with $u = F(y)[1 - f(y)]$ and *v=y*, we obtain,

$$A = 2\int_a^b y\left[F(y) - \frac{1}{2}\right]f(y)dy, \qquad (2)$$

By transformation of variables, defining *y(F)* as the inverse function of *F(y)*, we obtain,

$$A = 2\int_0^1 y(F)\left(F - \frac{1}{2}\right)dF \qquad (3)$$

Note that *F* is uniformly distributed between *[0, 1]* so that its mean is $\frac{1}{2}$. This means that *(3)* can be written as,

$$A = 2\,cov\,[y, f(y)] \qquad (4)$$

Dividing by the mean of y yields the relative Gini. Stuart recognized the relationship between the absolute Gini and the covariance, but his interest was in the correlation coefficient.

Given *(4)*, it becomes simple to calculate the Gini. First, obtain the rank *(R)* for each observation *i*. Next, calculate the covariance between *R* and *y*. Since *R/n* terms are the empirical representation of *F(y)*, we must divide this covariance by *n*. Divide the covariance by mean *y*, multiply by 2 and we have the Gini of *y*. Unlike standard approaches for calculating the Gini, this method requires no grouping of individual data to economize on computations.

A simple transformation of *(4)* shows the relationship between the Gini and standard regression coefficients. This relationship is convenient for purposes of interpretation as well as calculation. A regression of *y* on *R/n* yields the slope coefficient,

$$B = \frac{cov(y,R/n)}{var(R/n)} \qquad (5)$$

The variance of *R/n* is a constant equal to *(1/12) (n + 1)/n*, which for large samples converges to *l/12*. Thus, the absolute Gini is essentially a constant times the regression coefficient.

The following table shows the calculation of Gini Index for Public healthcare beneficiaries in Mizoram:

Xi	*ni*	*Ni*	*Fi=pi*	*Xi*Ni*	*Cum Xi*ni*	*qi*	*pi-qi*
2000	1	1	0.002380	2000	2000	0.000118	0.002261
2500	1	2	0.004761	2500	4500	0.000267	0.004494
3000	1	3	0.007142	3000	7500	0.000446	0.006696
3000	1	4	0.009523	3000	10500	0.000624	0.008899
3000	1	5	0.011904	3000	13500	0.000803	0.011101
3000	1	6	0.014285	3000	16500	0.000981	0.013304
3000	1	7	0.016666	3000	19500	0.001160	0.015506
3000	1	8	0.019047	3000	22500	0.001336	0.017708
4000	1	9	0.021428	4000	26500	0.001576	0.019851
4000	1	10	0.023809	4000	30500	0.001814	0.021994
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
500000	1	420	1	500000	16808014	1	0

$$Gini\ Index = \frac{Piqi}{Fi = pi} = 0.47353$$

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- Published Article "Performance and problems of healthcare providers in Mizoram" with supervisor in International Journal of Research in Social Science, Volume 10, issue no. 5, May 2020.
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- "Asymmetry of information and its impact on patients' satisfaction regarding healthcare: A case study of Civil Hospital, Aizawl" in one day international seminar on "Sustainable Development: The Way Forward" organized by Mizoram Economic Association (MEA) in collaboration with Planning & Programme Implementation Department, Government of Mizoram in Aizawl on 5th December, 2019.
- "Trend and pattern of healthcare system in Mizoram" in a webinar organized by Mizoram University, Aizawl, Mizoram on 22nd July, 2021.
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- "International Conference on New Frontiers in Engineering, Science, Law, Management, Humanities and Social Sciences" organized by Eudoxia Research Centre–India in collaboration with Maryam Abacha American University of Nigeria, Kano on 26th to 28th August, 2022.
- "International Workshop on Qualitative Research Design and Analysis" organized by Eudoxia Research University, ERU-USA powered by World Cultural Studies Research Association: WCSRA on the 10th to 14th October, 2022.

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ABSTRACT

ECONOMIC ANALYSIS OF PUBLIC HEALTHCARE SYSTEM IN MIZORAM

AN ABSTRACT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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DEPARTMENT OF ECONOMICS

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MAY 2023

ECONOMIC ANALYSIS OF PUBLIC HEALTHCARE SYSTEM IN MIZORAM

BY

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In partial fulfillment of the requirement of the Degree of Doctor of Philosophy in Economics of Mizoram University, Aizawl.

1: INTRODUCTION

There is a worldwide consensus that health is one of the most important factors for social welfare, economic growth and development and progress at large. A healthy population leads to a vibrant and strong economy by increasing the productivity as well as the working capacity of the labour force. Hence, a healthy population or workforce is necessary for human resource development which will ultimately lead to the desired outcome of any economic policy—sustained long-run growth and development. As such, the importance of health cannot be neglected in the field of economic study and research. At the same time, an unhealthy population riddled with chronic disease, epidemic and many other maladies is a burden for all policy makers and Governments across the world at large. So, a sound economic progress is liked with health and the provision of healthcare facilities to its population.

2: REVIEW OF LITERATURE

In the quest for designing a suitable methodology and framework to elicit service quality, Parasuraman et al., (1991) mentioned that SERVQUAL can be usefully combined with additional qualitative or quantitative analysis to examine the factors influencing the SERVQUAL study's main issue areas. SERVQUAL is a good starting point for measuring and optimizing service efficiency, but it's not considered to be the final solution. Its five-dimensional structure provides a useful tool for measuring and evaluating a company's service quality output over time and against competitors. (Parasuraman, Zeithaml, & Berry, 1991)

In our modern society where ratings and reviews play a crucial role in economic transactions, the indispensable nature of its simplest form, i.e., word-of-mouth cannot be neglected, Burnham et al., (2018) found that customer satisfaction is positively correlated with positive-word-of-mouth (PWOM) and recommendation likelihood measures identify, or mediate, the impact of satisfaction on PWOM. Furthermore, their study found that word of mouth (WOM) opportunity is strongly correlated with PWOM and significantly increases the probability of recommendation through PWOM. (Buraham & Leary, 2018)

With regard to productivity and efficiency, Alatawi et al., (2020) assessed the performance of public hospitals in Saudi Arabia by employing Data Envelopment Analysis (DEA) to measure the technical efficiency of 91 public hospitals. Their assessment included four inputs, and six output variables taken from the Ministry of Health databases for 2017. They conducted the assessment via PIM-DEA V.3.2 software. Their findings identified 69 out of 91 public hospitals as technically inefficient. The average efficiency score was 0.76, indicating that hospitals could have reduced their inputs by 24 percent without reduction in health service provision. Their study concludes by stating that most hospitals were technically inefficient and operating at suboptimal scale size and indicate that many hospitals may improve their performance through efficient utilization of health resources to provide the current level of health services. (Atalatawi, Niessen, & Khan, 2020)

3: AREA OF THE STUDY

Mizoram is one of the states of Northeast India, with Aizawl as its capital city. The name is derived from Mi (people), Zo (lofty place, such as a hill) and Ram (land), and thus Mizoram implies *"Land of the hill people"*. Like several other northeastern states of India, Mizoram was previously part of Assam until 1972, when it was carved out as a Union Territory. It became the 23rd state of India, a step above Union Territory, on 20 February 1987.

4: PUBLIC HEALTHCARE IN MIZORAM

Healthcare covers a broad spectrum of personal health services ranging from health education and information through prevention of disease, early diagnosis, treatment and rehabilitation. The term health services imply organisation, delivery, staffing, regulatory and quality control (Thangdailova, 2003). Equitable distribution of healthcare facilities matters a lot for serving the needy population and it is first of all, critical to understand the context of time and space. It is important to examine the healthcare history of the area of study to be able to understand how far progress have been made, what things to be expected and what should be the future vision as well.

Attainment of statehood in 1987 appears to be positively associated with increasing hospital healthcare. By 2001 there were 7 hospitals in the state which increased to 8 by 2010, one each in the eight districts of Mizoram. There was enormous growth of hospital institution in the state after 2001 mainly because of the emergence of non-government hospital. Today there are 37 hospitals in the state. This is a reflection of progress and improvement in the field of medical among the Mizo. However, almost all these non-government hospitals are concentrated only in Aizawl reflecting inherent urban bias of private initiative. As of 2020, there are 13 Public Hospitals across various districts in the state. 1,478,146 patients were treated in Out Patient Department (OPD) in 2018-19 and 307,972 were treated in In Patient Department (IPD) respectively. The bed strength of Public Hospitals in Mizoram currently stood at 1366.

5: SIGNIFICANCE OF THE STUDY

Health economics has not been extensively studied at research level in Mizoram. As such, there have been only few studies regarding the provision of health facilities and its impact on the economy. Moreover, there has been no suitable study regarding patients' satisfaction and their willingness to pay for health and healthcare facilities.

Mizoram is one of the smallest states rampant with critical illness such as cancer, cardiovascular disease and other lifestyle related diseases such as diabetes and hypertension. Besides the social cost, a study of the economic cost of provision of health and healthcare facilities is one of the most important and much needed studies in economic literature. This research will also inquire about the nature of welfare economics and whether the provision of free and basic healthcare facilities to the population leads to welfare of the masses.

This research also aims at assessing delivery of health and healthcare facilities to patients in a public hospital. Also, the bahvioural pattern of the patients will be studied in order to elicit patients' satisfaction, perception and expectation with regard to the provision of healthcare services for the community at large.

6: CONCEPTUAL FRAMEWORK

In order to enrich the subject matter of this research, it is important to briefly elucidate about the conceptual framework—the theories and concepts that is used as the core of this research work.

In economics, the concept of welfare is used in a narrow sense: it is limited to only material economic welfare. Welfare Economics imparts economic science a normative character. It is the study of conditions that maximize economic welfare of society as a whole. In the words of Oscar Lange, "Welfare economics is concerned with the conditions which determine the total economic welfare of a community." (Lange, 1942) The function of welfare economics is to evaluate alternative economic situations and determine whether an economic situation yields greater economic welfare than others. Welfare economics may also be defined as that branch of economic science which evaluates alternative patterns of resource allocations from the viewpoint of maximizing economic welfare of the society as a whole. (Graff, 1957)

In 1953 Sten Malmquist, a Swedish economist and statistician, published in Trabajos de Estadistica a quantity index for use in consumption analysis. The index uses input distance functions (gauge functions in mathematics) to compare two or more consumption bundles, and uses an indifference curve of one of the consumers as a reference set. (Malmquist, 1953) Later Caves et al., (1982) (CCD) adapted Malmquist's idea to production analysis. They showed that, under certain market, technology and behavioral conditions, the geometric mean of a pair of adjacent-period Malmquist input (output) quantity indexes is equal to a Tornqvist (1936) input (output) quantity index. (Caves, Christensen, & Diewert, 1982)

The inquiry of patients' satisfaction revolves around 5 dimensions used for measurement of service quality known as SERVQUAL instrument proposed by Parasuraman et al., (1991). These dimensions are also called the RATER dimensions and consist of the following dimensions: The reliability dimension is related to the provision of services as promised, e.g., providing services effectively the first time and providing services at the right time. Security is the ability to infuse trust in customers and to make them feel secure in

transactions. Tangible objects relate to physical conditions such as decoration, ambience and appearance at the place of service, appearance such as cleanliness and clothing of the staff and the use of clean modern equipment. Empathy means to best serve the interests of the customers and to understand the needs of the customers. Responsiveness means letting customers know when services are being provided and reflecting a willingness to help customers. (Parasuraman, Zeithaml, & Berry, 1991)

7: OBJECTIVES OF THE STUDY

1. To study the institutional provision of public healthcare system in Mizoram
2. To highlight the trends and pattern of healthcare provision by Public Hospitals in recent years
3. To interpret the economic and financial benefits accruing to the beneficiaries of Public Hospitals' services when compared with their private sector counterparts
4. To show the trends in efficiency and productivity of various Public Hospitals in Mizoram
5. To find out the socio-economic conditions of healthcare beneficiaries of public hospitals in Mizoram
6. To determine the level of patients' satisfaction of public hospitals in Mizoram

8: HYPOTHESES

1. There is an increasing trend in monetary welfare (in terms of opportunity cost) accruing to beneficiaries of Public Hospitals in Mizoram over the years.
2. There is an increase in productivity and efficiency of Public Hospitals in Mizoram over the years.
3. There is widespread inequality (expressed in monetary income) among Public Healthcare beneficiaries in Mizoram.
4. There is a significant relationship between SERVQUAL dimensions and overall satisfaction of Public Healthcare beneficiaries in Mizoram.
5. There is a significant relationship between geographical dimensions and overall satisfaction of Public Healthcare beneficiaries in Mizoram.

6. There is a significant relationship between socioeconomic dimensions and overall satisfaction of Public Healthcare beneficiaries in Mizoram.

9: METHODOLOGY

The study is based on primary and secondary data. Secondary data is obtained from both published and unpublished sources like magazines, journals, e-resources, and books etc. for collecting necessary information especially from Health Directorate, Government of Mizoram. The data collected is analyzed using relevant and appropriate economic and statistical techniques.

For measuring economic welfare in monetary terms (express as opportunity cost), public cost and private cost across various Public Healthcare services are compared, viz., out-patient department consultation, in-patient stay and cost of various investigations and follow-up being done across various public hospitals in Mizoram. After the costs comparison are expressed in monetary terms, the real monetary welfare is obtained after the nominal monetary welfare is adjusted for inflation.

In the first stage, the actual cost of availing healthcare services is calculated, i.e., real money cost incurred by beneficiaries of public hospitals in Mizoram. Second, the opportunity cost is calculated, i.e., the cost that patients might have incurred had they avail healthcare services elsewhere like private healthcare providers. Then the opportunity cost is subtracted from the actual cost in order to extract the monetary compensation expressed as the difference between opportunity cost and actual cost. Lastly, the monetary compensation is adjusted for inflation by taking into consideration the CPI inflation of the current period to find out whether there is a real increase in monetary compensation accruing to the beneficiaries of public hospitals in Mizoram over recent years, i.e., during the study period between 2016-17 and 2020-21.

Efficiency and productivity are calculated using output-oriented Malmquist Productivity Index (MPI) which is a variation of Data Envelopment Analysis (DEA) technique. Besides, relevant statistical techniques and data analysis software are employed for the analysis of secondary data.

A multi-stage cluster sampling procedure is used for the study. First, clustering the state of Mizoram into 8 districts, other 3 districts viz., Saitual, Khawzawl and Hnahthial are not included since they are not yet fully functional during the study period. In the second stage, all Public Hospitals across various districts are identified, totaling 11 hospitals. Third, sample size for each hospital is calculated in the districts identified in stage-I. In the fourth stage, the respondents are selected using a simple random technique of balloting without replacement.

Taro Yamane formula is used for determining the sample size which yields 420 patients or beneficiaries of Public Hospitals. Inequality among Public Healthcare beneficiaries is obtained using a general method of Gini Index calculation. The time of visit to the selected hospitals is determined on random basis. Patients are selected from the hospitals at the time of the visit using the hospital register as a sampling frame. The structured interview schedule for this research follows the dimensions of the SERVQUAL instruments developed by Parasuraman et. al., (1991). Reliability of the structured interview schedule is verified using Cronbach's alpha, KMO and Bartlett's test.

This research primarily employed service gap model to assess the effective quality of the hospitals. The gap is defined between the expectation variable and the perception variable that forms the calculation (P-E=Service Quality Gap Score) (Parasuraman et. al., 1985). Descriptive statistics are used to examine the demographic and socioeconomic profile of the respondents. For an inquiry of the relationship between the dimensions of SERVQUAL, geographical and socioeconomic conditions with customer satisfaction and word of mouth, independent samples Mann-Whitney U Test and independent samples Kruskal-Wallis Test are used.

10: CHAPTER PLAN

Chapter I : Introduction

Chapter II : Review of Literature

Chapter III : Trends and Pattern Analysis and Institutional Provision

Chapter IV : Analysis of Economic Welfare, Efficiency and Productivity

Chapter V : Analysis of Socio-Economic, Service Quality and Patients' Satisfaction

Chapter VI : Findings, Recommendations and Conclusions

Bibliography

11: MAJOR FINDINGS

- The share of healthcare expenditure expressed in GDP across the world has been stagnating below 10 percent. At the same time, the per capita expenditure on healthcare has been increasing gradually year by year.
- India has been spending below 5 percent of its GDP over the years and actually decreases from 3.596 and 3.504 percent in 2015-16 to 2.952 and 3.104 in 2.018-19. In terms of PPP, it shows a gradual increase during the first two years but declined in the succeeding years–196.498 and 204.647 USD in 2015 and 2016 but declined to 181.529 and 195.565 USD in 2018 and 2019; but in 2019 it starts to increase again with 211.002 USD. The average total per capita health expenditure expressed in PPP for India is 197.848 during 2015-19.
- In North-East India, Mizoram has the highest health expenditure as the share of its total expenditure with 645 crores out of 7731 crores INR being spent on health in 2015-16. Also, Mizoram has the highest health expenditure as a percentage of its total state expenditure with 8.34 percent.

- Mizoram has the highest per capita health expenditure among the North-East states with 5862 INR which is equal to 4.20 percent of its GSDP of 15339 crores INR in 2015-16. Assam has the lowest per capita health expenditure with only 1546 INR which is equal to barely 2.21 percent of its GSDP of 226276 crores INR in 2015-16. On the other hand, Sikkim has the lowest health expenditure as a share of its GSDP with 1.81 percent of 16954 crores INR in 2015-16; but its per capita health expenditure is higher than Assam with 5126 INR.
- The total patient care being done at various Public Hospitals in Mizoram during 2016-21 is highest in Civil Hospital, Aizawl–OPD as well as Casualty patients–throughout the study period, i.e., 2016-21, with a total out-patient care (OPD and Casualty) of 1951597 during this period.
- The total OPD care is highest in 2019-20 with 789216 total patient care and lowest in 2020-21 with a total patient care of 515663 between 2016 and 2021. The trend in OPD care has been increasing gradually with a sharp decline in the last year of the study period.
- The total Casualty care or treatment is highest in 2018-19 with 101485 patient care and lowest in 2020-21 with a total patient care of only 72467 between 2016 and 2021. The total recorded patient care during the study period (i.e., 2016-21) is 3769167.
- Civil Hospital, Aizawl has the highest admission (OPD and Casualty) throughout the study period, i.e., 2016-21 with a total admission (OPD and Casualty) of 71772 during this period. Kulikawn Hospital has the lowest total admission (OPD and Casualty) with 5158 admissions during 2016-21.
- The total OPD admission is highest in 2018-19 with 40395 admissions and lowest in 2020-21 with a total admission of 32087 between 2016 and 2021. The total admission through Casualty highest in 2017-18 with 8795 admissions and lowest in 2019-20 with a total admission of only 6429 between 2016 and 2021. The total recorded admissions during the study period (i.e., 2016-21) is 226383.
- Civil Hospital, Aizawl has the highest operations done throughout the study period, i.e., 2016-21 with a total operation (Major and Minor) of 81848 during this period.

Regional Cancer Centre has the lowest operations done (Minor only) with 51 minor operations done during 2016-21.

- The total Major operations is highest in 2019-20 with 12166 operations done and lowest in 2020-21 with total operations of 7855 between 2016 and 2021. The total Minor operations done is highest in 2016-17 with 28089 operations and lowest in 2020-21 with a total operation of only 15401 between 2016 and 2021. The total recorded operations done during the study period (i.e., 2016-21) is 171249.
- The total live discharge is highest in 2017-18 with 42892 discharges and lowest in 2020-21 with a total discharge of 32885 between 2016 and 2021. The total death discharge is highest in 2019-20 with 1536 discharges and lowest in 2020-21 with a total discharge of 1271 between 2016 and 2021. The total recorded discharge during the study period (i.e., 2016-21) is 209146.
- Medicine department has the highest patients throughout the study period across various Public Hospitals in Mizoram, i.e., 2016-21 with patients (New Case and Old Case) of 755135 during this period.
- The total Major operations is highest in 2019-20 with 12166 operations done and lowest in 2020-21 with total operations of 7855 between 2016 and 2021. The total Minor operations done is highest in 2016-17 with 28089 operations and lowest in 2020-21 with a total operation of only 15401 between 2016 and 2021. The total recorded operations done during the study period (i.e., 2016-21) is 171249.
- The total live discharge is highest in 2017-18 with 42892 discharges and lowest in 2020-21 with a total discharge of 32885 between 2016 and 2021. The total death discharge is highest in 2019-20 with 1536 discharges and lowest in 2020-21 with a total discharge of 1271 between 2016 and 2021. The total recorded discharge during the study period (i.e., 2016-21) is 209146.
- Medicine department has the highest patients throughout the study period across various Public Hospitals in Mizoram, i.e., 2016-21 with patients (New Case and Old Case) of 755135 during this period.
- The total New Case is highest in 2019-20 with 662281 patients and lowest in 2020-21 with a total patient of 427742 between 2016 and 2021.

- The total days of patients discharged is highest in 2019-20 with 264239 total days and lowest in 2020-21 with total days of patients discharged of 195099 between 2016 and 2021. The total recorded cumulative days of patients discharged during the study period (i.e., 2016-21) is 1174875.
- The total in-patient census is highest in 2019-20 with 232042 and lowest in 2020-21 with 161145 between 2016 and 2021. The total cumulative in-patient census during the study period (i.e., 2016-21) is 996713.
- The average bed occupancy is highest in 2018-19 and 2019-20 with 0.71 in both years and lowest in 2020-21 with 0.56 between 2016 and 2021. The total average bed occupancy rate during the study period (i.e., 2016-21) is 0.88.
- The bed turnover ratio is highest in 2016-17 with 3.83 and lowest in 2019-20 and 2020-21 with 3.52 for both years. The total bed turnover ratio during the study period (i.e., 2016-21) is 3.63.
- The maximum daily census of indoor patients is highest in 2019-20 with 10303 and lowest in 2016-17 with 8720 between 2016 and 2021. The minimum daily census of indoor patients is highest in 2019-20 with 6700 and lowest in 2020-21 with 5054 between 2016 and 2021.The cumulative total daily indoor patients during the study period (i.e., 2016-21) is 76201.
- Cases referred outside Mizoram is highest in 2017-18 with a total of 2926 and lowest in 2020-21 with a total of 1183 between 2016 and 2021. The cumulative total number of cases referred outside Mizoram across the various Public Hospital establishments during the study period, i.e., 2016-21 is 12138.
- Mizoram State Healthcare Scheme beneficiaries is highest in 2016-17 with 5144 and lowest in 2019-20 with 2022 during 2016-21. The cumulative total of Mizoram State Healthcare Scheme beneficiaries is 20081 between 2016 and 2021.
- PMJAY beneficiaries is highest in 2019-20 with 18399 and lowest in 2016-17 with 10968 during 2016-21. The cumulative total of PMJAY beneficiaries is 63745 between 2016 and 2021.
- The total laboratory investigations done is highest in 2019-20 with 1426765 and lowest in 2017-18 with 867611 between 2016 and 2021. The cumulative total

recorded laboratory investigations done during the study period (i.e., 2016-21) is 5633789.

- The total X-Ray investigations done is highest in 2019-20 with 62611 and lowest in 2020-21 with 38662 between 2016 and 2021. The cumulative total recorded X-Ray investigations done during the study period (i.e., 2016-21) is 248699.
- Inflation adjusted monetary compensation in investigations and follow-up is highest in 2019-20 with ₹2,663,425,836 and lowest in 2017-18 with ₹1,409,771,632. The total monetary compensation in investigations and follow-up to the public for employing public hospitals during the study period, i.e., 2016-17 to 2020-21 is ₹11,969,917,205.
- When the monetary compensations from employing out-patient consultation are adjusted for inflation, the total actual monetary compensation is reduced to ₹829,411,148. Inflation adjusted monetary compensation in consultation of doctors employed in public hospitals is highest in 2019-20 with ₹229,677,192 and lowest in 2020-21 with ₹103,558,172.
- When the actual opportunity costs of minor operations are adjusted for inflation, the total actual opportunity cost is reduced to ₹672,909,040. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to minor operations done is highest in 2016-17 with ₹161,810,916 and lowest in 2020-21 with ₹69,542,948.
- When the actual opportunity costs of major operations are adjusted for inflation, the total actual opportunity cost is reduced to ₹1,047,966,764. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to major operations done is highest in 2019-20 with ₹284,465,926 and lowest in 2020-21 with ₹126,681,548.
- When the actual opportunity costs of in-patient stay are adjusted for inflation, the total actual opportunity cost is reduced to ₹1,420,910,640. Inflation adjusted total actual opportunity cost for availing healthcare services in public hospitals with regard to in-patient care is highest in 2019-20 with ₹372,167,605 and lowest in 2020-21 with ₹189,531,511.

- The mean efficiency change (effch) during 2017-21 is 1.011, i.e., there is an average increase in efficiency of 1.1 percent; out of which the highest increase in efficiency is in firm no. 2 where effch increases by 28.5 percent while the lowest is firm no. 10 with a decrease in efficiency by 16.9 percent.
- The mean technical efficiency change (techch) during 2017-21 is 0.958, i.e., there is an average decrease in technical efficiency of 4.2 percent; out of which the firm with the highest increase in technical efficiency is firm no. 4 where techch increases by 8.6 percent while the lowest is firm no. 11 with a decrease in technical efficiency by 10.3 percent.
- The mean pure efficiency change (pech) during 2017-21 is 1.024, i.e., there is an average increase in pure efficiency of 2.4 percent; in which the highest increase in pure efficiency accrues to firm no. 2 where pech increases by 28.3 percent while the lowest is firm no. 10 with a decline in pure efficiency by 3.2 percent.
- The mean scale efficiency change (sech) during 2017-21 is 0.988, i.e., there is an average decrease in scale efficiency of 1.2 percent; in which the highest increase in scale efficiency is found in firm no. 11 where sech increases by 3.9 percent while the lowest is firm no. 10 with a decline in scale efficiency by 14.2 percent.
- The mean total factor productivity change (tfpch) during 2017-21 is 0.969, i.e., there is an average decrease in total factor productivity of 3.1 percent; in which the highest increase in total factor productivity among the firms is firm no. 2 where tfpch increases by 19.9 percent while the lowest is firm no. 10 with a decline in total factor productivity by 18.9 percent.
- DMUs or firms that shows an average decline in total factor productivity during 2017-21 are firm no. 1, 3, 5, 6, 7, 8, 10 and 11. Firm no. 1 due to decrease in technical efficiency change (0.942); firm no. 3 due to technical efficiency change (0.944); firm no. 5 due to technical efficiency change (0.931); firm no. 6 due to technical efficiency change (0.938); firm no. 7 due to technical efficiency change (0.931); firm no. 8 due to efficiency change (0.944), technical efficiency change (0.955) and scale efficiency change (0.944); firm no. 10 due to efficiency change (0.831), technical efficiency

change (0.976), pure efficiency change (0.968) and scale efficiency change (0.858); and firm no. 11 due to technical efficiency change (0.897).

- DMUs or firms that shows an average increase in total factor productivity during 2017-21 are firm no. 2, 4 and 9. Firm no. 2 due to increase in efficiency change (1.285), pure efficiency change (1.283) and scale efficiency change (1.001); firm no. 4 due to efficiency change (1.010), technical efficiency change (1.086) and pure efficiency change (1.010); firm no. 9 due to efficiency change (1.034), technical efficiency change (1.020) and scale efficiency change (1.034).
- Total patient care in out-patient department is highest in 2019-20 in public hospitals with 798216 total patient care and lowest in 2020-21 with 515663; while in private hospitals, total patient care is highest in 2019-20 with 211213 and lowest in 2020-21 with 181369.
- Total patient care in casualty or emergency is highest in 2019-20 in public hospitals with 101485 total patient care and lowest in 2020-21 with 72476; while in private hospitals, total patient care is highest in 2019-20 with 89535 and lowest in 2016-17 with 44865.
- Total admissions from OPD are almost similar with minimal differences in public and private hospitals with a cumulative total of 189792 and 183686 respectively during 2016-21. Total admission from OPD is highest in 2018-19 in public hospitals with 40395 and lowest in 2020-21 with 32087; while in private hospitals, total admission from OPD is highest in 2019-20 with 41798 and lowest in 2017-18 with 33805.
- Minor operations done are much higher in public than private hospitals with a cumulative total of 119254 and 35464 respectively during 2016-21. Total minor operations done is highest in 2016-17 in public hospitals with 28089 and lowest in 2020-21 with 15401; while in private hospitals, total minor operations done is highest in 2019-20 with 7883 and lowest in 2016-17 with 6086.
- Major operations done are relatively higher in public than private hospitals with a cumulative total of 51995 and 40535 respectively during 2016-21. Total major operations done is highest in 2019-20 in public hospitals with 12166 and lowest in

2020-21 with 7855; while in private hospitals, total major operations done is highest in 2018-19 with 8877 and lowest in 2017-18 with 7659.

- Live discharge is higher in private than public hospitals with a cumulative total of 227268 and 201988 respectively during 2016-21. Total live discharge is highest in 2018-19 in private hospitals with 48648 and lowest in 2020-21 with 40332; while in public hospitals, total live discharge is highest in 2017-18 with 42892 and lowest in 2020-21 with 32885.
- Death discharge is higher in public than private hospitals with a cumulative total of 7158 and 6990 respectively during 2016-21. Total death discharge is highest in 2019-20 in public hospitals with 1536 and lowest in 2020-21 with 1271; while in private hospitals, total death discharge is highest in 2019-20 with 1456 and lowest in 2016-17 with 1393.
- There are 194 males and 226 female respondents. Male constitutes 46.2 percent and Female 53.8 respectively. The age distribution shows that there are 40 respondents below the age of 18 or 9.5 percent; 197 respondents between the age of 19 and 40 which constitute 46.9 percent of the total respondents; 129 respondents of 41-60 age group with 30.7 percent out of the total respondents and 54 respondents above 60 with 12.9 percent.
- There are 35 respondents who are illiterate with 8.3 percent; 94 respondents who have elementary level of education with 22.4 percent; 190 respondents acquire high school or its equivalent diploma with 45.2 percent; and there are 101 or 24.0 percent who acquire bachelor's degree or above with regard to educational attainment.
- In terms of residential area, there are 174 or 41.2 percent who live in city area; 106 or 25.2 percent in district capitals; 40 or 9.5 percent in RD block towns; and 100 or 23.8 percent in villages. City Area has the highest number of respondents in terms of residential area followed by district capital, village and RD block towns.
- The occupational structure shows that there are 72 or 17.1 percent who are dependent; 67 or 16.0 percent who are unemployed; 51 or 12.1 percent who are agricultural workers; 76 or 18.1 percent who are daily wage earners; 25 or 6.0 percent who are

corporate employee; 55 or 13.1 percent who are government employee; and 74 or 17.6 percent who are self-employed.

- The poverty status of the respondents shows that there are 58 or 13.8 percent who falls under AAY category; 146 or 34.8 percent in BPL category; and 216 or 51.4 percent in APL category. In terms of living conditions, there are 94 or 22.4 percent living in kutcha houses; 150 or 35.7 percent in semi-pucca houses; and 176 or 41.9 percent in pucca houses.
- Monthly income distribution shows that there are 78 or 18.6 percent below ₹10,000; 253 or 60.2 percent between ₹10,000-₹50,000; 76 or 18.1 percent between ₹50,000-₹100,000; and 13 or 3.1 Above ₹100,000.
- There are 150 respondents or 35.7 percent under chronic illness; 70 or 16.7 percent under viral infection; 113 or 26.9 percent under critical illness; 29 or 6.9 percent under delivery and child health; and 58 or 13.8 percent under accidental category.
- In terms of annual expenditure on healthcare, there are 160 respondents or 38.1 percent whose annual expenditure falls below ₹10,000; 112 or 26.7 percent between ₹10,000-₹30,000; 67 or 16.0 percent between ₹30,000-₹50,000; and 81 or 19.3 percent whose annual expenditure on healthcare is above ₹50,000.
- Families whose poverty status is in line with AAY category has relatively lower expenditure on healthcare as compared to BPL or AAY families such that only 1 family has had a healthcare expenditure above ₹50,000.
- Despite the relative difference in expenditure on healthcare based on poverty status, most of the respondents in all the three categories have an average expenditure on healthcare below ₹10,000 with 160 family count. Among BPL family, there are 38 families whose annual healthcare expenditure is above ₹50,000 which is relatively the highest among the three poverty status categories.
- The lowest negative mean gap score among the five SERVQUAL dimensions is responsiveness with a score of -0.334.
- The highest negative mean gap score among the five SERVQUAL dimensions is tangibles with a score of -1.200.

- With regard to SERVQUAL score in various districts of Mizoram, the lowest negative mean gap score is attained by District Hospital, Lawngtlai with a score of -0.403 followed by Civil Hospital, Lunglei; District Hospital, Kolasib; District Hospital, Mamit and Civil Hospital, Aizawl with a score of -0.695, -0.758, -0.814 and -0.898 respectively.
- There are three districts with a negative SERVQUAL gap score of greater than -1, viz., District Hospital, Serchhip with a score of -1.306 followed by District Hospital, Champhai and District Hospital, Siaha with a score of -1.306 and -2.264 respectively. Among these three districts, District Hospital, Siaha has the highest negative mean gap score of -2.264.
- The Gini Index among the 420 public healthcare beneficiaries is 0.474 which shows that income inequality is moderately low.
- In reliability dimension, the *Mann-Whitney U test* shows a significant result, i.e., *(U=6.074, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of reliability dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 32.88 while patients who are satisfied scored a mean rank of 217.53. This shows that reliability dimension plays a crucial role in patients' overall satisfaction.
- *Mann-Whitney U test* in assurance dimension gives a significant result, i.e., *(U=5.700, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of assurance dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 56.22 while patients who are satisfied scored a mean rank of 216.61. This shows that assurance dimension plays a crucial role in patients' overall satisfaction.
- Again, with regard to responsiveness dimension, the independent samples *Mann-Whitney U test* gives a significant result, i.e., *(U=6.049, p<0.05, i.e., 0.000)*. Hence

the null hypothesis is rejected and there is a significant difference in the mean rank of responsiveness dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 34.41 while patients who are satisfied scored a mean rank of 217.47. This shows that responsiveness dimension plays an important role in patients' overall satisfaction.

- Also, an independent samples *Mann-Whitney U test* is used to examine whether the distribution of empathy dimension is the same across all categories of overall satisfaction. A significant result was found *(U=6.245, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of empathy dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 22.16 while patients who are satisfied scored a mean rank of 217.96. This shows that empathy dimension plays an important role in patients' overall satisfaction.
- Finally in word-of-mouth *Kruskal-Wallis test* is employed. It shows a significant result of *(H(6)=1.590, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of word-of-mouth dimension, i.e., patients who are satisfied or not satisfied with the healthcare services being provided across various public hospital establishments in Mizoram. Patients who are not satisfied scored a mean rank of 41.38 while patients who are satisfied scored a mean rank of 217.20. This shows that word-of-mouth, i.e., negative or positive commends from others play an important role in patients' overall satisfaction and making use of public hospitals' services.
- An independent samples *Kruskal-Wallis test* is used to examine whether the distribution of overall satisfaction is the same across categories of residential area. A significant result was found *(H(3)=24.079, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of satisfaction with regard to the residential area of patients. This indicates that patients' overall satisfaction across various residential areas differ. Follow-up pairwise

comparison indicated that patients from RD Block town are more inclined to be satisfied with the healthcare services being provided by public hospitals as compared to other residential areas.

- *Kruskal-Wallis test* of independent sample is used to examine whether the distribution of overall satisfaction is the same across categories of various district. A significant result was found *(H(7)=95.253, p<0.05, i.e., 0.000)*. Hence the null hypothesis is rejected and there is a significant difference in the mean rank of satisfaction with regard to various district of patients. This indicates that patients' overall satisfaction across various districts differ. Follow-up pairwise comparison indicated that patients from Lawngtlai district are more inclined to be satisfied with the healthcare services being provided by public hospitals as compared to other districts.
- Also, to highlight the relationship between poverty status and overall satisfaction, an independent samples *Kruskal-Wallis test* is employed. An insignificant result was found *(H(2)=0.888, p>0.05, i.e., 0.641)*. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on poverty status, i.e., patients' overall satisfaction is not influenced by monetary income.
- The *Mann-Whitney U test* an insignificant result, i.e., *(U=22.562, p>0.05, i.e., 0.571)* with regard to the relationship between gender and overall satisfaction. Hence the null hypothesis is accepted and there is no significant difference in overall satisfaction based on gender, i.e., patients' overall satisfaction is not influenced by gender.

12: RECOMMENDATIONS

Empirical based recommendations

- There is a widespread regional inequality in terms of infrastructure across various public hospitals in Mizoram. There should be a proper framework that cater to equitable distribution of resources that are necessary for ensuring the provision of good and quality healthcare services.
- In order to increase productivity and efficiency, public hospitals should ensure effective redistribution of manpower and other facilities that are required for effective healthcare provision. It can be seen from the analysis that some public hospitals do

not achieve technical efficiency (*te*) due to decrease in manpower and other facilities required for impeccable provision of healthcare services.

- The lowest negative mean gap score among the five SERVQUAL dimensions is responsiveness. There is a room for further improvement in the interpersonal domains of responsiveness without extravagant expenditures by the hospitals staff. The staff must improve their responsiveness in improving their service delivery based on patient expectations. Timely and effective communication to patients can help reduce their anxiety as well as of their family members.
- Based on the findings of the tangible quality of the hospitals under study, it is strongly recommended to ensure that the staff in the hospitals should be professionally dressed. Quality meals should be prepared and patients must have choices in the menu during treatments. And the location of the hospitals should be easily accessible and convenient. Moreover, facilities such as medical equipment and machines are in a dilapidated state in most of the Public Hospitals under study which desperately need renovation and improvement. This can be done by allocating more untied funds from the Government through various schemes or programs that will address and implement the needful with regard to proper maintenance of this quintessential public good.
- Much of the discontent with regard to healthcare provision by public hospitals can be attributed to negligence and post-hospitalization services. For the improvement of the reliability of the hospitals it is suggested here that they must prevent operational and functional breakdowns, identify failure when it occurs and intercede before harm is caused or mitigate the harm caused by failures that are not detected or intercepted. And to further redesign the process based on the critical failures identified.
- The vital role plays by sympathy and understanding toward patients should be reiterated to healthcare professionals. Besides medical treatment, patients need reassurance and peace of mind throughout their recuperation period which can have positive effect on their overall well-being. It should be in the heart of healthcare professionals to be courteous and considerate towards their patients. Capacity building through workshops or conference with clinical psychologists or social

workers would lead to a favourable outcome towards improvement in Empathy dimension.

- Political will plays an important role with regard to efficient and effective public healthcare provision. It can be seen that the existing Public Hospitals have been quite indispensable for the general public in terms of monetary welfare provision and other basic healthcare needs. The Government should ensure their smooth functioning by allocating more resources to public healthcare services.

General recommendations

- Robust feedback and grievance redressal should be set up by the hospitals to take swift actions. The Government or directorate responsible for supervision should establish a formal redressal cell that can be availed through online as well as offline mode.
- Also, more information pertaining to the type of healthcare services and other necessary prerequisites should be duly updated on the websites maintained by the directorate. This will ensure free flow of information which plays a pivotal role in the provision of quality healthcare services.
- There is shortage of trained and skill doctors, nurses, technicians and other medical staff, because of this they are performing an overlapping role which reduce the amount of time they can devote for their patients. This reduces their reliabilities as seen in the gap score of the reliability test. It is therefore recommended that the hospitals must be enhanced in terms of trained and skill health care providers. It is further suggested here that the Government should spend more on public health care, since higher wages will attract a greater number of skilled manpower. Higher government spending will also enable hospitals to acquire better medical supplies and equipment. A quantum increase in budget allocation on health care is the need of the hour in Mizoram in particular and India as a whole.
- In India, Health care became a profitable venture for private players. There is no compulsion from the Government to get an accreditation for small entrants, this leads to mushroom growth of small clinics without proper quality control. They do not have

to provide any minimum quality, yet they flourish because they are affordable. People too are neither aware of the quality parameters nor bothered about it. They consult whichever is cheap. It is therefore, suggested here that the state Government must regulate and monitor these private entrants for better medical facilities.

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