

THE HEALTHCARE SERVICES DELIVERY AND MEDICAL SUPPLY MANAGEMENT: THE CASE OF CANCER MANAGEMENT IN NORTH-EAST INDIA



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ABSTRACT

The Healthcare Services Delivery and Medical Supply Management involves developing and implementing techniques to ensure efficient and affordable healthcare goods and services including infrastructure, medicines, medical devices, equipment, mobile health units, healthcare workers and doctors are getting mobilized from one place to another, especially in hard-to-reach areas with poor road connectivity and limited facilities.

The Indian Healthcare Service Business (both public and private) has seen a drastic transformation in the past few years due to the emergence of innovative management policies and inclusive business models; but delivering healthcare service in India is still a complex process, because of diverse cultural, geographical and socio-economical differences. The North-East region of India has high cancer incidence and mortality as compared to the rest of the country. The difficult geographical terrain with tea garden areas, hilly, and forest areas spread across the region poses challenges in providing untroubled healthcare, particularly for cancer patients. The challenges like accessibility, medical transportation, and travel burden for patients can have a striking impact on healthcare service and business profitability by limiting the resources supply, infrastructure, poor association with stakeholders, and reduction in the number of patients. The healthcare service delivery and medical supply management can enhance healthcare delivery and facilities like road, drinking water, electricity, and e-communication. It forces healthcare marketers to look beyond the horizon as it can completely transform the healthcare scenario and market penetration in such rigid areas and helps both the payer and provider by reducing the cost and maximizing the profit.

Keywords	cancer care, healthcare business, healthcare service delivery, healthcare facilities, medical supply management
JEL Classification	I11, I18, O21, L21
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INTRODUCTION

The Indian Healthcare System has been hanging on an unbalanced scale of resources and facilities since its inception. On one side of the scale, we have flashy and top-shelf health infrastructure delivering the healthcare services to deep-pocketed urban Indians, while on the other side, small shabby structures in the name of health centers are bearing a load of patients. They have rock bottom medical facilities and nominal healthcare services, especially in hard to reach remote villages with poor road connectivity, rural and predominantly hilly areas like the North-East region of India, where 80 percent population lives in the rural areas and have higher cancer incidence and mortality as compared to the rest of the country. Lack of awareness, accessibility, affordability, absence of resources, poverty, travel burden for patients, and poor transportation and supply chain management are the main demons altering the delivery of quality care and adversely affecting the healthcare business in the region.

The Healthcare Services Delivery and Medical Supply Management is a process of developing and applying techniques to foster the delivery of healthcare services. It involves mobilization of all healthcare facilities including, infrastructure, medicines, medical devices, equipment, mobile health units, healthcare workers, doctors, and other medical supplies from one place to another to the needy patients at proximity. This can be a boon for both customers/consumers and service providers as patients will not travel outside the region to get treatment. Hence service demand, supply, and stakeholder connectivity will increase.

LITERATURE REVIEW

R B Smarta (2017) referred healthcare system as a group of individuals, resources, and organizations that provide healthcare benefits, including hospitals, emergency services, pharmaceuticals, medical insurance, and innovative healthcare technologies to the people.

According to WHO (2015), a health system comprises all organizations, individuals, and activities whose primary job is advancement, reestablishment, and health maintenance. This incorporates activities to impact the determinants of health and more direct health-improving exercises.

According to Y. Abdulsalam and E. Schneller (2017), medical supplies comprise laboratory materials, supplies for surgeries, testing kits, medicines, nutrition, and other pharmaceutical products.

According to Gurrit K Sethi (2017) to build a healthcare delivery is not an easy task; it is a complex process in which different enterprises and their various elements meet up, for example, the pharma company, the IT firm, the hospital — all meet up with clinical



administrations to make healthcare. They all work in coordination to provide a better healthcare

OBJECTIVES OF HEALTHCARE SERVICES DELIVERY AND MEDICAL SUPPLY MANAGEMENT

1. To understand the efficient and cost-effective delivery of healthcare services in difficult geographical terrain and hard to reach areas with poor road connectivity.
2. To explore integrated and consistent delivery of affordable quality care to every patient irrespective of cultural, economic, social, and geographical differences.
3. To strengthen the supply chain and service mobilization in rural and remote areas.
4. To maximize the healthcare business profitability by increasing the penetration in new potential markets.
5. To capture the previously untouched and underprivileged areas where medical services are poor, and resources are limited.

METHODOLOGY

In this paper, the researchers have done secondary research. Many databases (e.g., WHO Universal Health Coverage) on healthcare services delivery and supply have been consulted. Extensive subject literature, review articles, and research papers were reviewed. Experts in the field have been contacted during paper development.

RESEARCH DESIGN

The researchers have performed research on the exploratory and descriptive approach based on the healthcare industry and their consumers, especially in North-East India. The research has been used to identify the significant factors involved in the improvement of healthcare services delivery and medical supply management in the North-East; the companies can start generating a profit by providing quality care for cancer and medical supply to almost every patient on a feasible and affordable rate. This has been exploratory and descriptive research, as it used both the secondary sources as research papers and other relevant study material. For this research, majority of data is gathered from secondary sources.

THE DAUNTING HEIGHTS OF NORTH-EAST & NEED FOR BETTER CANCER CARE DELIVERY

Healthcare services delivery has always been a challenging task in Northeast India. The region is covered with dense forests, hilly land, char/ riverine, and hard to reach rural and remote areas with poor road connectivity, making it difficult for both providers and patients to deliver and access the care.

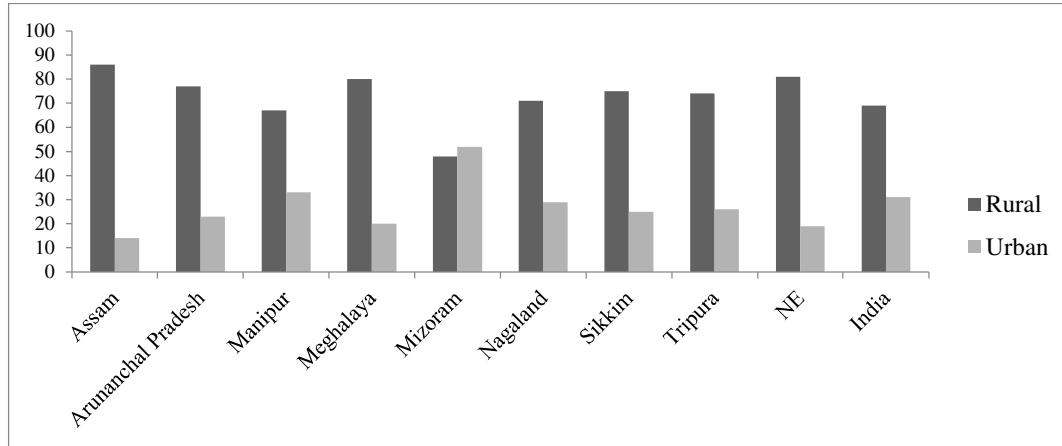
In the past few years, the Northeast has seen an unconventional growth in the incidence and mortality of all types of cancers. Consumption of tobacco, dietary habits, and hygiene habits is the leading risk factor for accelerating the region's incidence rate. Unfortunately, adequate cancer care facilities are not present in the region to deal with this fatal health catastrophe. Cancer awareness, screening/diagnostic facilities, chemotherapy, radiotherapy, palliative care facilities are most concentrated in the cities and have not reached remote and rural parts.



DEMOGRAPHIC AND SOCIO-ECONOMIC PROFILE OF NORTH-EAST REGION

The Northeast region is the eastern-most part of India, having 46 million populations, and comprises 3.76 percent of India's total population, having eight states commonly known as the "Seven Sisters"- Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. Assam is the most populated state with 30.57 million populations and comprises nearly 70 percent of the entire region. Topographically 70 percent of the land of the region belongs to hills, which accommodates about 30 percent of the total population.

Figure 1: Rural-Urban Population (in Percent) (2011-12)



Source: Census of India, 2011

Figure 1 shows that the maximum population of the northeast is rural. Nearly 80 percent of the population lives in rural areas, and only 20 percent of the population lives in urban areas. Most of the cancer care infrastructure is situated in the region's urban areas, and patients have to travel a lot to get cancer care services.

Table 1: A Comparative Socio-Economic Data of 8 NE States and India (2018-19)

State	Population	Per Capita GSDP	Health expenditure % of GSDP	Literacy rate (%)	% of child malnutrition	% of SC/ST Population	% of Population below BPL	Sex Ratio/1000 male
Assam	30.06 Million	\$1299	2.21	72.19	47% (stunted), 14% (wasted)	6.9/12.4	32	958
Arunachal Pradesh	1.7 Million	\$ 2129	3.29	65.38	28.4% (stunted), 17% (wasted)	0.6/64.2	35	938

Manipur	2.8 Million	\$1110	2.79	79.21	33.2% (stunted), 7.1% (wasted)	4/35.1	37	992
Meghalaya	3 Million	\$1376	2.40	74.43	42.9% (stunted), 13.1% (wasted)	0.58 /86.15	12	989
Mizoram	1.09 Million	\$2401	4.20	91.33	26.9% (stunted), 14.3% (wasted)	0/94.4	20.40	976
Nagaland	2.2 Million	\$1764	2.97	79.55	29% (stunted), 11.8% (wasted)	0/86.5	18.88	931
Sikkim	0.6 Million	\$5487	1.81	81.42	28% (stunted), 5.1% (wasted)	4.6/33.8	8.19	953
Tripura	4.5 Million	\$1,770	2.41	87.22	31% (stunted), 16.12% (wasted)	17.8/31.8	14.05	960
India	1.38 Billion	\$2170	1.6	74.04	35% (stunted) 19.8% (wasted)	16.6/8.6	22	933

Source: National Health Profile, 2019 Published by Central Bureau of Health Intelligence

The Northeast is blessed with an abundance of natural resources and prosperous land. However, due to the continuous negligence towards socio-economic development, the proper industrial utilization of the resources is not done. Table 1 shows that the region comprises eight different states having a common set of lifestyle patterns to some extent and has a dominance of tribal population, but they have sharp differences in the socio-economic conditions. The population living below the poverty line is high; most people are small farmers and tea garden workers, having low income and a difficult livelihood. Especially in the rural areas, the socio-economic conditions are pathetic as compared to the urban areas and all Indian figures. The region is struggling with poverty, malnutrition, and poor development strategies.

EPIDEMIOLOGY PROFILE

The region has poor screening programs to diagnose more cases at an early stage. Most of the cases are diagnosed at an advanced stage, and the cases diagnosed at a localized stage are lower as compared to the rest of India. The possibility of developing cancer is very high in North-East, ranging from 1 in 5 persons to 1 in 16 persons in the rest of India. The five-year



survival rate for head & neck, breast & cervix cancer is lower in the North East than India's. Most of the cases in the region are associated with the consumption of tobacco.

**Table 2: Relative Proportion (In Percentage)
(Age-Adjusted Incidence Rate) 2012-14**

Leading Sites of Cancer in Males	Relative Proportion (AAR) %	Leading Sites of Cancer in Females	Relative Proportion (AAR) %
Oesophagus	13.4 (14.7)	Breast	14.2 (11.3)
Lung	10.9 (13.3)	Cervix Uteri	12.3 (10.1)
Stomach	9.2 (10.5)	Oesophagus	7.3 (7.1)
Hypopharynx	6.7 (7.4)	Lung	7.0 (7.0)
Mouth	4.5 (4.9)	Gall Bladder	6.9 (6.3)

Source: National Center for Disease informatics and research, ICMR Bangalore (2012-14)

Table 2 shows that in 2012-14 in North East India, cancers of the esophagus, lungs, hypopharynx are most common in males and females, the breast, cervix, esophagus, and gall bladder cancers lead the list.

Table 3: All Sites: Age-Adjusted Incidence Rates (Aars) of Different PBCRS of North-East (2012-16) (Based on the Latest Population-Based Cancer Registry)

DISTRICT	(AARs) Males	(AARs) Females
Aizwal district	269.4 (206.2)	214.1(171.4)
East Khasi Hills district	227.7 (131.0)	118.6(76.9)
Kamrup Urban	213.0 (190.5)	169.6(150.8)
Mizoram State	207.0 (146.1)	172.3(127.5)
Papumpare district	201.2 (94.8)	219.8(105.1)
Meghalaya district	176.8 (92.6)	96.5(55.7)
Cachar district	129.0 (99.2)	104.8(87.33)
Nagaland	124.5 (74.5)	88.2(56.3)
Pasighat district	120.4 (99.7)	116.2(88.1)
West Arunanchal	101.0 (83.3)	96.3(56.3)
Imphal West district	95.3(85.1)	110.9(107.9)
Dibrugarh district	91.9(72.5)	76.8(66.0)
Sikkim State	88.7(69.9)	97.0(75.3)

Tripura State	80.9(67.0)	58.3(57.57)
Manipur State	62.8(47.0)	71.1(57.6)

Source: Report of National Cancer Registry Programme (2012-2016)

Table 3 shows the cancer pattern and incidence of PBCRs for different sites of cancer. In the Aizawl district, the incidence is highest (AAR, 269.4) in males, and in females, Papumpare district (AAR, 219.8) has the highest incidence for all sites of cancer.

HEALTH SYSTEM PROFILE

Regardless of its abundance of natural resources and the high centralization of business and business activities among the North-eastern states, the region still has not achieved the desired healthcare results. Low per capita income, illiteracy, high population density, disparities in rural areas, poor water, and hygiene facilities all have added somewhat in some form to the poor healthcare system.

Table 4: Number and Proportion of Cancer Patients taking Treatment within and outside Northeast (2012-14)

State of Residence	Within NE		Outside NE		Total
	Number	%	Number	%	Number
Arunachal Pradesh	149	84.2	28	15.8	177
Assam	8305	93.4	590	6.6	8895
Manipur	103	37.6	171	62.4	274
Meghalaya	157	80.9	37	19.1	194
Mizoram	51	41.8	71	58.2	122
Nagaland	111	21.3	411	78.7	522
Sikkim	1	1.7	59	98.3	60
Tripura	224	63.5	129	36.5	353

Source: National Center for Disease informatics and research, ICMR Bangalore (2012-14)

Table 4 shows that in states like Sikkim, Nagaland, Manipur, and Mizoram, most cancer patients are traveling outside the region to get treatment due to the non-availability of healthcare facilities cancer care infrastructure.

Table 5: Average Medical Expenses (Rs.) during Hospital Stay Per Case of Hospitalization (2017-18)

State	Average medical expenses (Rs.) during hospital stay per case of hospitalization in			
	Public hospitals		Private hospitals	
	Rural	Urban	Rural	Urban
Assam	4545	7842	28785	71657
Arunachal Pradesh	3793	4810	13966	23497
Manipur	5932	9051	60361	39541

Meghalaya	1894	7668	14870	35687
Mizoram	5622	7528	19558	47740
Nagaland	4648	5089	13098	19699
Sikkim	3339	2915	24805	19168
Tripura	3314	6077	64017	67139
All-India	4290	4837	27347	38822

Source: Key Indicators of Social Consumption in India: Health; NSS 75th Round July 2017-June 2018, released in November 2019

Table 4 shows that in Assam, Manipur, Mizoram, and Tripura average medical expense is high in public and private hospitals as compared to India's average medical expense

HEALTHCARE SERVICES DELIVERY MANAGEMENT

Medical organizations and other health care firms need to manage the complex structure of the system to create and develop procedures that will prompt positive changes in the delivery of healthcare services in the Northeast. An organization's performance comprises three factors: the strategies, how they implement them, and the environment. Before executing the strategies, it becomes necessary to know the root cause of the problem. Administrators can develop better health outcomes by implementing strategies at various different levels, starting from their own organization's system. Diminishing the patient's waiting time at health centers will save each individual's time engaged in the process. Applying innovative technologies to improve service delivery, such as new network-based organizations, a firm's self-sufficiency, value-based pricing, and new technologies, will help manage the healthcare system.

ROLE OF PUBLIC & PRIVATE HEALTHCARE BUSINESSES IN STRENGTHENING THE HEALTHCARE SERVICES DELIVERY IN NORTH-EAST

Despite the abundance of natural resources, the region has poor resource management strategies to use these assets completely. Private healthcare investors have stayed away from the region due to the area's geographical challenges and insurgency-infested nature. The local businesses also avoid big ventures because of the vulnerability and the danger involved with such uncertain conditions of the region.

The absence of medical facilities and health care professionals is one of the biggest issues to deal with. There is a lack of well-equipped medical, paramedic, and nursing organizations to treat fatal diseases like cancer. The need for medical professionals goes beyond the posts approved by the government. In Sikkim and Assam, the available Community Health Centres (CHCs) are not enough in numbers to bear the load of patients. Aside from the absence of top-notch medical Infrastructure, there is also a deficiency of medical administrators, specialists, female health workers, and supervisors. Other basic needs like power supply, connectivity, and clean drinking water required for proper medical care also fall behind.

To remove these healthcare disparities, setting up more PHCs, involving more PPP models, providing training to healthcare professionals, and promoting cancer literacy among the region's population, providing end to end palliative care, awareness on early warning signs of cancer is required.

Establishing a more acceptable climate for the entry of private firms in the medical care area in the region and welcoming good investment from them for setting up top-notch



infrastructure, healthcare organizations, and other medical services could be a boon for the region.

With the contribution of private players in the field, the point of accomplishing the desired healthcare infrastructure would be achieved more sooner.

The entry of private organizations will improve the healthcare facilities to serve the needy patients along with making a profit for the organization.

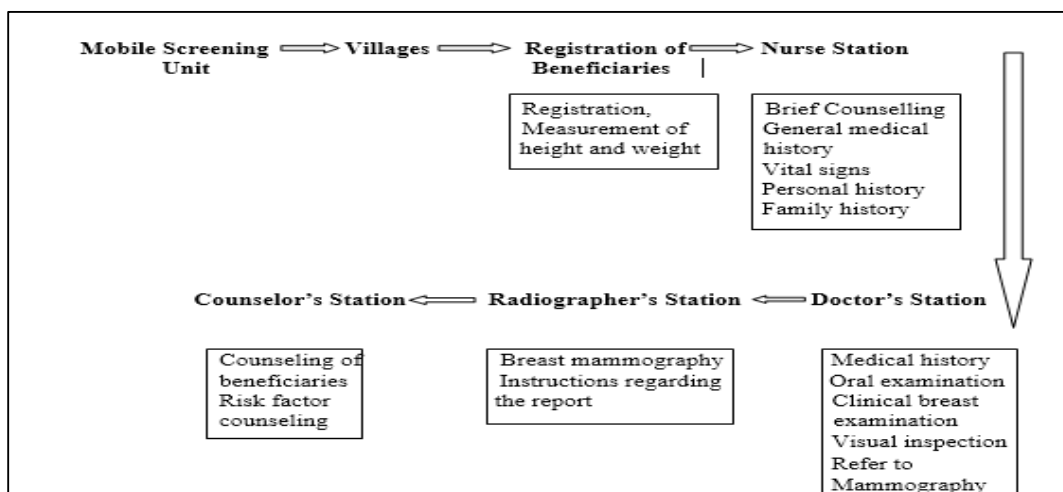
EXAMPLE CASES OF HEALTHCARE BUSINESS MODELS IN INDIA WITH ADVANCED DELIVERY AND SUPPLY SERVICES

1. D.E.S.H PROGRAMME BY PIRAMAL SWASTHYA

It is a community based mobile screening unit by Piramal Swasthya, which gives services like direct counseling to positive detected patients, the arrangement of transport for patients to Dr. B. Borooah Cancer Institute, safe and secure Electronic Medical Record for each patient with a novel recipient ID for checking and tracking, referral and development of positive patients and guaranteeing end-to-end quality care. Patients should be enlisted with the current Atal Amrit Yojana program. This program covers a populace of 15 lakh in far off villages of the Kamrup region.

The people, especially in villages of the region, do not have access and awareness for cancer care services. To remove these disparities, (Piramal Swasthya Management and Research Institute-PSMRI) in a joint effort with semi govt organization (Dr. Bhubaneswar Borooah Cancer Institute, Guwahati-BBCI), dispatched an inventive program known as D.E.S.H (Detect Early, Save Her and Him) in the rustic Kamrup region (Figure 2). The program intends to diminish the extent of late-stage finding and mortality from the oral, bosom, and cervical malignancies through network-based mindfulness, screening, and reference program.

Figure 2: The Operation Flow Chart of D.E.S.H



Source: Piramal Swasthya Website (2019)

2. ASSAM CANCER CARE FOUNDATION (ACCF)



ACCF is a joint association between the Government of Assam and Tata Trust, tending to reduce the cancer burden in Assam. At present, one apex hospital handles end-to-end patient care and is more focused on various small centers interlinked with the annexed body. These small centers are proposed to be set up to deal with diagnosis and care and to shift load away from annexed hospitals. This PPP Partnership is removing cost-related burden in the state alongside medical advancement. They are additionally conducting education and awareness programs. It is an innovative program to convey care and due consideration to the patients. A state-of-art cancer research institute is also being set up in Guwahati to study local cancer types by the Assam Cancer Care Foundation.

ACCF DISTRIBUTED CARE MODEL

Their cancer care model was designed to create patient-centric cancer care to deliver standardized and affordable care at patient's proximity. They have divided cancer treatment into three layers consisting of L1, L2, and L3 hospitals.

- L1 hospitals situated in Guwahati functions as the apex body, and it is the referral unit providing extensive treatment and diagnostic services along with research.
- L2 hospitals have the facility to conduct surgeries apart from providing radiation. They will be annexed to Government Medical Colleges providing comprehensive cancer care services other than research, situated in Barpeta, Dibrugarh, Diphu, Silchar districts of Assam
- L3 hospitals in Darrang, Jorhat, Kokrajhar, Lakhimpur, Tezpur are annexed to District Hospitals (DH), providing diagnostics and cancer daycare services like chemotherapy and radiation therapy.

KEY FUNCTIONS

ACCF has been effectively conducting community outreach programs in far-off zones with lesser admittance to medical services like screening non-communicable diseases (NCDs) and reaching into distant locations; a joint effort with local associations has been an additional bonus. A versatile team of dental specialists, nurses, doctors, and data managers are working with Community Health Officers (CHOs) and female multipurpose workers (MPs) for cancer screening.

3. GLOCAL HEALTHCARE SYSTEMS

Glocal Healthcare model provides acute care in small cities and villages with a population of 1,00,000 through its chain of hospitals in more than 11 such focussed radius areas in different parts of India. When a stroke or cardiovascular attack, or a tragic accident happens, shipping a patient to a major city is generally not feasible and excessively costly. Thus, providing emergency care and ICU to save lives in such cases becomes their main priority. They have surgery and diagnosis facilities in cardiology, neurosurgery, muscular health, injury, respiratory diseases, and nephrology.

People come to them in critical conditions. Hence, Glocal Healthcare clinics have more than 100 beds, with many ICU beds, advanced and well-prepared machines, diagnostic offices, drug stores, clinical staff, young and dedicated specialists. They have situated themselves between secondary and tertiary emergency care hospitals in small cities.

The traffic is excellent, and business is sustainable alongside giving successful medical care in a society where very few major healthcare organizations serve. The Government-run



hospitals for secondary care in distant towns are generally underprepared, understaffed, crowded, and insufficient and capable enough to deal with the crisis.

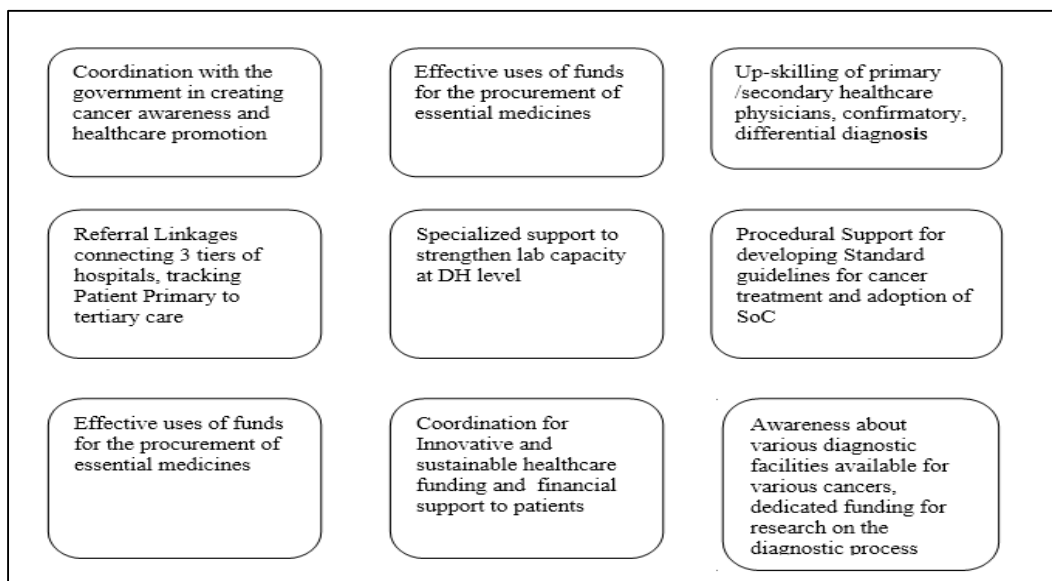
In the previous ten years, Glocal has built up well-prepared hospitals and put medical teams in place at such small towns as Bhagalpur, Muzaffarpur, Behrampur, Begusarai, Amroha, Medinipur, Krishnagar, and Jeypore. They are situated in highway groups close to those towns and smaller cities where doctors can travel. Different facilities and infrastructures can be shared and moved between the clinics without any problem. Glocal has additionally started digital dispensaries for primary medical services. It is an electronic unit in far off area, overseen by a certified nurse. It can perform 25 specific tests with two drops of blood quickly; ECGs and ultrasound can be done; the nurse can likewise use the electronic stethoscope to produce the specialist's pulses to see far away areas through the internet teleconsultation/video conferencing. The specialist can likewise observe the skin rash of patients through a derma scope utilized by the nurse. The nurse takes care of the information, tests report, and symptoms to the computer, which creates possible disease conditions from its information base and is imparted to the doctor in far areas. The doctor gives a prescription, and it goes to the dispenser, which gives the prescribed medicine in required doses for the rural patients. This is a great innovation for providing reasonable and comprehensive medical care for individuals in distant regions. It is a significant outreach strategy of Glocal since it connects its hospitals in small cities to the village for the mounted cases to be managed in hospitals.

ANALYSIS AND DISCUSSION

TRANSFORMATION STRATEGY FRAMEWORK FOR THE DELIVERY OF CANCER CARE SERVICES IN NORTH-EAST

Although much has to be done in North-East at the ground level and it will take a little longer to achieve the desired transformation strategy framework for cancer care, the concept solutions mentioned below (Figure 3) for the development of a scalable end to end cancer care framework, that will help to improve the patient outcomes.

Figure 3: Desired Transformation in the delivery of Cancer Care Services in North-East



Source: Author compilation

According to our study findings, NE India is arising as the hub for cancer. Considerable attention must be given to the region with a multidimensional and layered approach to reduce the region's cancer burden. Due to the lack of cancer-specific infrastructure and absence of treatment guidelines, "a multidisciplinary approach" to handle the issue is required. There is a severe need for transformation in cancer care facilities in the Northeast Region. Cancer care services like palliative care, radiotherapy, chemotherapy, etc., should be set up and fortified. These solutions will also help in diminishing the load at the tertiary-level and specialized centers.

CONCLUSION

Each healthcare system is battling with increasing expenses and decreasing quality worldwide, despite putting all the hard work and good intentions by much-prepared healthcare professionals. Healthcare professionals and policymakers have attempted to fix the issues by capturing fraud, diminishing errors, implementing guidelines for practice, improving patients to be better consumers, and executing electronic medical records. However, none have had many effects. Now, it is an ideal time to propose new strategies by the service providers.

The business's focus should be on amplifying value for patients; that is, accomplishing the best results at the least expense, especially in a region like the Northeast where delivering medical care is not an easy task due to its geographical location and socio-economical challenges. The Northeast service providers should shift themselves from a delivery-based health care system that revolves around what healthcare professionals demand and towards a more focused system on what patients need. The healthcare organizations should replace the present fragmented system of delivering cancer care in the Northeast with a layered approach and remote locations to deliver high-value care. In this way, healthcare providing companies, including hospitals, pharmaceutical companies, and other medical organizations, can generate licit revenue by serving needy patients at a reasonable cost.

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