

Public Health Infrastructure: Perceptual Analysis

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Abstract: *This study investigates physicians' perceptions of public health infrastructure across sub - centers, primary health centers, and community health centers in Mandya District, India. A structured interview schedule was used to gather data from 154 physicians, with analysis performed using ANOVA and Tukey HSD tests. Results indicate significant variations in infrastructure, with better facilities observed at community health centers compared to sub - centers and primary health centers. The study emphasizes the need for enhanced facilities at primary health centers to improve healthcare delivery and trust in public health systems.*

Keywords: Public health infrastructure, Physicians' perception, Mandya District, Healthcare Facilities, Community Health Centers

1. Background

People are living longer, healthier, and more productive lives as a result of a global shift in human health. Good health is a key predictor of economic growth and a component of population well - being. Human happiness and well - being are dependent on good health. It contributes significantly to economic advancement because healthy people live longer, are more productive, and save more. In the context of health, the word "physical infrastructure" has a far broader connotation. It includes not only healthcare facilities, dispensaries, and hospitals, but also well - trained service personnel. As a result, the goal of a healthcare system is to provide individuals with accessible healthcare services, thereby enhancing their health.

The availability of healthcare services has a significant impact on demographic indices such as infant mortality, death, and birth rates. A well - developed, equitable, and accessible health infrastructure is critical to the country's citizens' health and wellbeing. Understanding a country's healthcare policy and welfare mechanism requires knowledge of its health infrastructure. Communities, states, and nations rely on public health infrastructure to prevent diseases, promote health, and address acute and chronic health risks. The cornerstone for planning, providing, analyzing, and improving public health is infrastructure. In any country, particularly in the developing world, the public health care system should be given top attention. WHO (2000) stated that the major purpose of a health system should be to improve health in a responsible and equitable manner. The development of health infrastructure enables a healthy workforce for the production of commodities and services in a country. It is the government's responsibility to ensure that its citizens have the right to a healthy lifestyle. This study aims to provide actionable insights into the disparities in public health infrastructure to guide policy decisions.

India has a mixed health - care system, inclusive of public and private health - care service providers. However, most of the private health - care providers are concentrated in urban India, providing secondary and tertiary care health - care services. The public health - care infrastructure in rural areas has been developed as a three - tier system based on the population norms and described below. ⁷ The urban health system is discussed in the article on *Urban Newborn*.

Sub - centers: A sub - center (SC) is established in a plain area with a population of 5000 people and in hilly/difficult to reach/tribal areas with a population of 3000, and it is the most peripheral and first contact point between the primary health - care system and the community. Each SC is required to be staffed by at least one auxiliary nurse midwife (ANM) /female health worker and one male health worker (for details see recommended staffing structure under the Indian Public Health Standards (IPHS)). Under National Rural Health Mission (NRHM), there is a provision for one additional ANM on a contract basis.

SCs are assigned tasks relating to interpersonal communication in order to bring about behavioral change and provide services in relation to maternal and child health, family welfare, nutrition, immunization, diarrhea control and control of communicable diseases programs. The Ministry of Health & Family Welfare is providing 100% central assistance to all the SCs in the country since April 2002 in the form of salaries, rent and contingencies in addition to drugs and equipment.

Primary health centers

A primary health center (PHC) is established in a plain area with a population of 30 000 people and in hilly/difficult to reach/tribal areas with a population of 20 000, and is the first contact point between the village community and the medical officer. PHCs were envisaged to provide integrated curative and preventive health care to the rural population with emphasis on the preventive and promotive aspects of health care. The PHCs are established and maintained by the State Governments under the Minimum Needs Program (MNP) /Basic Minimum Services (BMS) Program. As per minimum requirement, a PHC is to be staffed by a medical officer supported by 14 paramedical and other staff. Under NRHM, there is a provision for two additional staff nurses at PHCs on a contract basis. It acts as a referral unit for 5 - 6 SCs and has 4 - 6 beds for in - patients. The activities of PHCs involve health - care promotion and curative services.

Community health centers

Community health centers (CHCs) are established and maintained by the State Government under the MNP/BMS program in an area with a population of 120 000 people and in hilly/difficult to reach/tribal areas with a population of 80 000. As per minimum norms, a CHC is required to be staffed by four medical specialists, that is, surgeon, physician, gynecologist/obstetrician and pediatrician

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supported by 21 paramedical and other staff. It has 30 beds with an operating theater, X - ray, labor room and laboratory facilities. It serves as a referral center for PHCs within the block and also provides facilities for obstetric care and specialist consultations.

First referral units

An existing facility (district hospital, sub - divisional hospital, CHC) can be declared a fully operational first

referral unit (FRU) only if it is equipped to provide round - the - clock services for emergency obstetric and newborn care, in addition to all emergencies that any hospital is required to provide. It should be noted that there are three critical determinants of a facility being declared as a FRU: (i) emergency obstetric care including surgical interventions such as caesarean sections; (ii) care for small and sick newborns; and (iii) blood storage facility on a 24 - h basis.

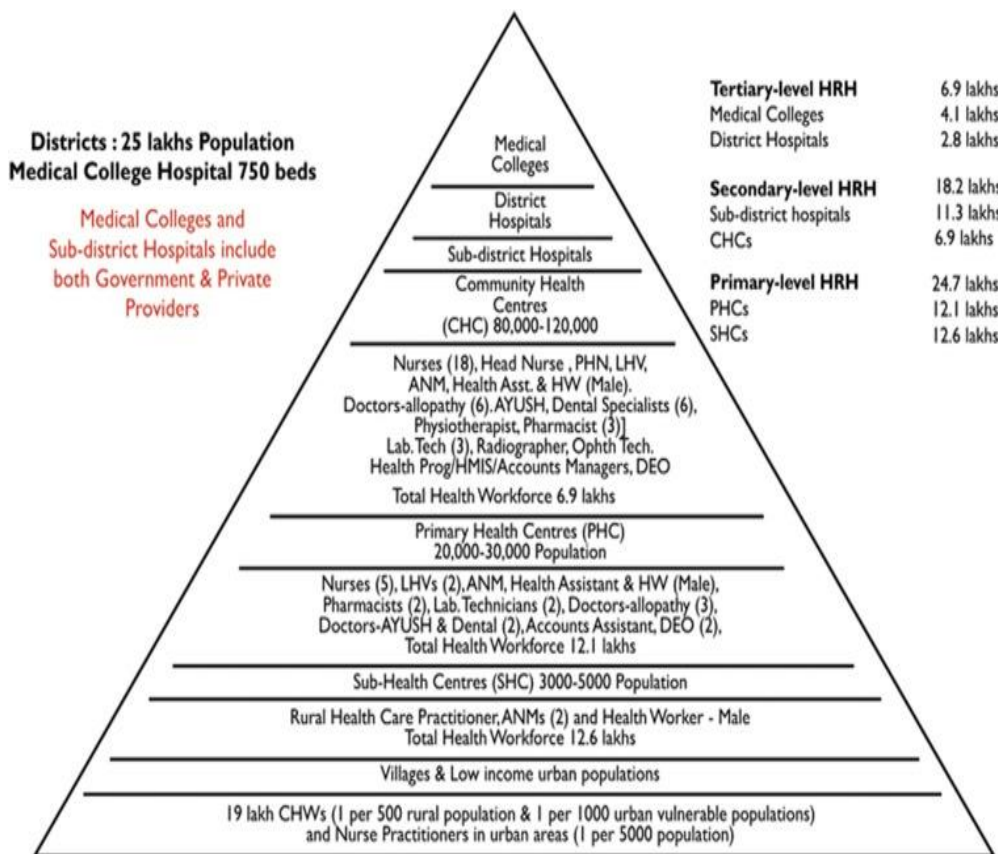


Figure: Indian Public Health System

Source: <https://pmc.ncbi.nlm.nih.gov/articles/>

Purpose of the Research

The role of the physician on a health care team is multi - faceted. The physician’s responsibilities are based on regulated scopes of practice. The physician is trained to provide leadership in developing and supervising the patient’s overall health care plan. The physician works collaboratively with the healthcare team to provide optimal care. The physician works to identify and meet the needs of the individual patient, the practice population, and the community by working with a variety of partners in the community, public health sector and hospital system.

The very purpose of the current research is to understand the role of Physicians in Public Health Delivery system and analyzing their perception of Public health infrastructure across Primary Health Center, Sub Center and Community Health centers that are spread across Mandya District.

2. Methodology

A perceptual analysis was conducted through structured interviews focused on attributes of the current public health

infrastructure. 154 Physicians that are chosen based on the availability and convenience of the researcher were interviewed in depth to measure their perception of infrastructure facilities to know are there any differences exists across SC, PHC and CHC facilities. The responses obtained are analyzed with help of ANOVA and further adopting TuKey HSD Test to locate the differences.

Hypothesis:

Researcher has measured the difference in the perception carried by the physicians from SHC, PHC and CHC about the infrastructure facilities at the health center with the help of ANOVA.

As the ANOVA test was found to be significant, further TuKey Test (Post - hoc Test) is carried out for multiple comparisons to locate the difference between and within the identified variable; perception and infrastructure facility

H0: There is no significant difference between perceptions of physicians across infrastructure facilities provided

Table 1: Results of TuKey HSD Test (Multiple Comparisons - Post - hoc Test)

Dependent Variable	(I) Physician's Perception	(J) Physician's Perception	Mean Difference (I - J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
						Tukey HSD	
Building condition	Sub Center	Primary Health Center	- 1.21843*	.17660	.000	- 1.6365	- .8004
		Community Health Centers	- 2.88060*	.31738	.000	- 3.6318	- 2.1293
	Primary Health Center	Sub Center	1.21843*	.17660	.000	.8004	1.6365
		Community Health Centers	- 1.66216*	.31493	.000	- 2.4076	- .9167
	Community Health Centers	Sub Center	2.88060*	.31738	.000	2.1293	3.6318
		Primary Health Center	1.66216*	.31493	.000	.9167	2.4076
OPD Facility	Sub Center	Primary Health Center	- 2.01573*	.13163	.000	- 2.3273	- 1.7042
		Community Health Centers	- .64983*	.23656	.018	- 1.2098	- .0899
	Primary Health Center	Sub Center	2.01573*	.13163	.000	1.7042	2.3273
		Community Health Centers	1.36590*	.23474	.000	.8103	1.9215
	Community Health Centers	Sub Center	.64983*	.23656	.018	.0899	1.2098
		Primary Health Center	- 1.36590*	.23474	.000	- 1.9215	- .8103
IPD Facility	Sub Center	Primary Health Center	.24627	.18991	.399	- .2033	.6958
		Community Health Centers	- .48450	.34129	.333	- 1.2924	.3234
	Primary Health Center	Sub Center	- .24627	.18991	.399	- .6958	.2033
		Community Health Centers	- .73077	.33866	.082	- 1.5324	.0709
	Community Health Centers	Sub Center	.48450	.34129	.333	- .3234	1.2924
		Primary Health Center	.73077	.33866	.082	- .0709	1.5324
Surgical Equipments	Sub Center	Primary Health Center	- 1.95623*	.10401	.000	- 2.2024	- 1.7100
		Community Health Centers	- 2.84501*	.18692	.000	- 3.2875	- 2.4026
	Primary Health Center	Sub Center	1.95623*	.10401	.000	1.7100	2.2024
		Community Health Centers	- .88877*	.18548	.000	- 1.3278	- .4497
	Community Health Centers	Sub Center	2.84501*	.18692	.000	2.4026	3.2875
		Primary Health Center	.88877*	.18548	.000	.4497	1.3278
Transportation Facility	Sub Center	Primary Health Center	- 1.68818*	.08422	.000	- 1.8875	- 1.4888
		Community Health Centers	- 3.11022*	.15136	.000	- 3.4685	- 2.7519
	Primary Health Center	Sub Center	1.68818*	.08422	.000	1.4888	1.8875
		Community Health Centers	- 1.42204*	.15019	.000	- 1.7775	- 1.0665
	Community Health Centers	Sub Center	3.11022*	.15136	.000	2.7519	3.4685
		Primary Health Center	1.42204*	.15019	.000	1.0665	1.7775
Electricity Facility	Sub Center	Primary Health Center	- 1.92719*	.08420	.000	- 2.1265	- 1.7279
		Community Health Centers	- 3.21929*	.15133	.000	- 3.5775	- 2.8611
	Primary Health Center	Sub Center	1.92719*	.08420	.000	1.7279	2.1265
		Community Health Centers	- 1.29210*	.15016	.000	- 1.6475	- .9367
	Community Health Centers	Sub Center	3.21929*	.15133	.000	2.8611	3.5775
		Primary Health Center	1.29210*	.15016	.000	.9367	1.6475
Water Supply	Sub Center	Primary Health Center	- 1.92719*	.08420	.000	- 2.1265	- 1.7279
		Community Health Centers	- 3.21929*	.15133	.000	- 3.5775	- 2.8611
	Primary Health Center	Sub Center	1.92719*	.08420	.000	1.7279	2.1265
		Community Health Centers	- 1.29210*	.15016	.000	- 1.6475	- .9367
	Community Health Centers	Sub Center	3.21929*	.15133	.000	2.8611	3.5775
		Primary Health Center	1.29210*	.15016	.000	.9367	1.6475
Sufficient number of Staff	Sub Center	Primary Health Center	- 1.35196*	.16211	.000	- 1.7357	- .9682
		Community Health Centers	- 1.53387*	.29134	.000	- 2.2235	- .8442
	Primary Health Center	Sub Center	1.35196*	.16211	.000	.9682	1.7357
		Community Health Centers	- .18191	.28909	.804	- .8662	.5024
	Community Health Centers	Sub Center	1.53387*	.29134	.000	.8442	2.2235
		Primary Health Center	.18191	.28909	.804	- .5024	.8662
Waste disposal Facility	Sub Center	Primary Health Center	- 1.16720*	.15275	.000	- 1.5288	- .8056
		Community Health Centers	- 2.14122*	.27452	.000	- 2.7910	- 1.4914
	Primary Health Center	Sub Center	1.16720*	.15275	.000	.8056	1.5288
		Community Health Centers	- .97401*	.27240	.001	- 1.6188	- .3292
	Community Health Centers	Sub Center	2.14122*	.27452	.000	1.4914	2.7910
		Primary Health Center	.97401*	.27240	.001	.3292	1.6188
Services rendered	Sub Center	Primary Health Center	- 1.50040*	.11991	.000	- 1.7842	- 1.2166
		Community Health Centers	- .89437*	.21549	.000	- 1.4044	- .3843
	Primary Health Center	Sub Center	1.50040*	.11991	.000	1.2166	1.7842
		Community Health Centers	.60603*	.21383	.014	.0999	1.1122
	Community Health Centers	Sub Center	.89437*	.21549	.000	.3843	1.4044
		Primary Health Center	- .60603*	.21383	.014	- 1.1122	- .0999
Overall Infrastructure	Sub Center	Primary Health Center	- 1.41267*	.13339	.000	- 1.7284	- 1.0969
		Community Health Centers	- 2.79104*	.23973	.000	- 3.3585	- 2.2236

Facility	Primary Health Center	Sub Center	1.41267*	.13339	.000	1.0969	1.7284
		Community Health Centers	- 1.37838*	.23788	.000	- 1.9414	- .8153
	Community Health Centers	Sub Center	2.79104*	.23973	.000	2.2236	3.3585
		Primary Health Center	1.37838*	.23788	.000	.8153	1.9414

*. The mean difference is significant at the 0.05 level.

Source: Survey Data

When SHC was compared with PHC and CHC & vice versa, the differences are found to be significant for all the groups for Building condition, OPD facility, surgical equipments, Transportation, Power Supply, Water Supply, waste disposal, services rendered and overall perception. *But the differences are not noticed for IPD facility and sufficient number of staff.*

Hence, the hypothesis is partially accepted for null hypothesis and rejected for Building condition, OPD facility, surgical equipment, Transportation, Power Supply, Water Supply, waste disposal, services rendered and overall perception indicating difference of perception for excluding for IPD and sufficient number of staff.

Outcomes:

The perceptual analysis of the Physicians indicates that facilities provided by the PHC, SHC and CHC vary in terms of the Building conditions, OPD, Surgical necessities, Transportation, Power and water supply, waste management and associated services rendered.

The physical infrastructure varies across the health centers and is found to be better at CHC compared to SHC and PHCs.

Health centers that are close to or located in the Taluks have better connectivity and transportation facilities compared to PHCs in remote areas along with number of staff and services rendered.

The CHC have much better facilities compared to both PHC and SHC in terms of building, staff, services, surgical equipments, power supply etc

This study highlights significant disparities in public health infrastructure across health centers in Mandya District, with community health centers showing superior facilities. These differences underline the urgent need for targeted improvements at primary health centers to bridge gaps in healthcare delivery. Policymakers must focus on enhancing infrastructure, staff availability, and essential services to build public trust in government healthcare systems.

3. Conclusion

Current research aimed at understanding and analyzing the perception of physicians across health centers concerning the infrastructure facilities available at health centers. The differences in infrastructure facilities and physicians' perceptions vary across health centers and are found to be significant statistically. Based on the outcomes, it is suggested that the state and centre must be endowed with more facilities to stop out of the pocket expenses of the patients and develop the trust about public health centers among the patients.

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