

# 1. Accessibility to Healthcare Facilities in Developing Nations

## Study Area: India

### 発展途上国における医療施設へのアクセシビリティについて

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Gaps in healthcare supply system plagued the usage pattern and generated mismatch between demand and supply. Inaccessibility due to several interconnected multifaceted dimensions infused exclusion. Choice of service providers, perceptions, supply system and multi-sector interdependence are some of the analysis that were conducted in the context of India. Ability to adapt in correspondence to impedances eased healthcare activity and infused satisfaction. Satisfaction again depended on the fulfillment of certain aspirations. Therefore to improve accessibility, neighborhood public infrastructure needed to be better utilized, while, fulfilling the aspiration of the residents. Policies derived from analysis were assessed to ensure acceptance and utilization.

#### 1. Introduction

Disparity and inadequate “accessibility to healthcare facilities” is one of the pressing issues that have been a cause of concern in developing countries. Cynicism about the health care system is apparent in most of the fast growing economies, such as India. On one hand social exclusion, financial overburden, and excess travelling are observed, on the other hand, excessive service loading on the regional facilities, low user ship in the local public healthcare facilities (HFs), organic growth of the private facilities and polarization of top-end facilities in the urban areas plague the supply system.

The approach of the policy makers in India has been to provide piecemeal solutions on the simplistic presumption of population catchments and therefore the complexity of the issue has not been dealt with appropriate acumen. For instance, in 1990, the unavailability of healthcare infrastructure was pointed out to be the key area of concern barring accessibility, which later the primary concern was the lack of healthcare insurance policy. During this phase, policy makers focused on the increase in numbers and to supplement in healthcare infrastructure, encouraged private investment, while neglecting the root cause problems of limited access for many. Due to lack of medical personnel, the public service suffered from low service delivery quality leading to a shift of choice of service provider occurred. With private services being expensive, coupled with the absence of insurance policy

the private service providers served the elite. Historically, budgetary investment in health sector has been low (1.1%, 2010); however, in recent past, exposed to severe criticism, the budgetary allocation has substantially been augmented. Under this tangled purview, it becomes prudent, to channelize the investment in order to internalize the benefits. Some of the criticisms about the Indian healthcare system are as follows:

- Basic Healthcare does not reach the majority of the population<sup>1)</sup>
- Infrastructure is in place in most areas, they are grossly underutilized<sup>2)</sup>
- With lack of insurance policy (3-5%), India had one of the highest out-of-pocket health expenditure in the world – estimated to be 71.1% in 2004-05<sup>3)</sup>
- The top end public facilities although offers world class facilities at affordable prices, but these are often overcrowded and overstretched<sup>4)</sup>
- Although high quality medical facilities caters to HIG, HMIG and medical tourists, however, the rural residents and poor have limited or no access to quality HFs
- Private providers of health care perform unnecessary diagnostic tests and surgical procedures with the intent of profit making<sup>5)</sup>
- 18% of the primary healthcare centers (PHCs) are without doctor and 38% without a laboratory technician<sup>6)</sup>
- Mistrust for the public services and accelerated

the growth of private services, in both urban and rural areas<sup>7)</sup>

- Total expenditure on health was around 4.13% by GDP; Expenditure in public healthcare sector is one of the lowest in the world - Estimated to be 1.10%

The goal of this dissertation was “Enable participation in healthcare activity without dependency, uncertainty and burden”, therefore reducing the inaccessibility and exclusion. The objectives therefore are as follows: (1) To devise methods for reducing “Do-nothing scenario” and thereby develop a patient centered policy intervention, (2) To reduce dependency in healthcare seeking tours, and (3) Increase user ship of local Health facilities (HF) – reducing the dependence on the regional HFs unless referred.

The healthcare seeking behavior is an outcome of complex decision behavior, which is not only dependent on the type and seriousness of illness (event) but also on respective endogenous capability and affordability of the healthcare seeker (and his/her family) and exogenous supply scenario. Therefore, it is assumed that variations in the endogenous and exogenous constraints (see table 1) added on to the complexity and variations in choices differing in service providers, travel patterns and satisfaction.

**Table 1: Factors affecting healthcare seeking behavior**

Spatial	Non Spatial	Psychometric
<ul style="list-style-type: none"> <li>▪ Unavailability of HF <ul style="list-style-type: none"> <li>• Geographical disparity of availability of HFs owing to polarization of facilities in the economically advanced urban region</li> </ul> </li> <li>▪ Mobility Issues <ul style="list-style-type: none"> <li>• Unavailability of desired transportation service</li> <li>• Physical</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Unavailability of certain medical services</li> <li>▪ Quality of service of the available HF in the neighborhood <ul style="list-style-type: none"> <li>• Differential service delivery standards for the rural and urban areas in public</li> </ul> </li> <li>• Private service providers seems to offer better quality than the public providers</li> </ul>	<ul style="list-style-type: none"> <li>▪ Self-Belief of the user</li> <li>▪ Attitude of the user</li> <li>▪ Perception about the HF</li> <li>▪ Goodwill of the HF</li> </ul>

<ul style="list-style-type: none"> <li>connectivity</li> <li>• Unreliable public transportation system, - unavailability of barrier free designed modes</li> </ul>	<ul style="list-style-type: none"> <li>▪ Temporal mismatch</li> <li>▪ Differential pricing policy</li> <li>▪ Financial constraints <ul style="list-style-type: none"> <li>• Unavailability of medical insurance policy</li> </ul> </li> </ul>	
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Primarily there are two types of adaptations (1) accumulation of resources to meet the expenses and (2) companionship and interaction between household members and households to make provisions for several types of impedances based on anticipations from previous experience and available information. Failure to adapt and cope up, sometimes lead to undue consequences of giving up healthcare seeking activity i.e., ‘to do nothing’.

**2. Data, methods and research flow**

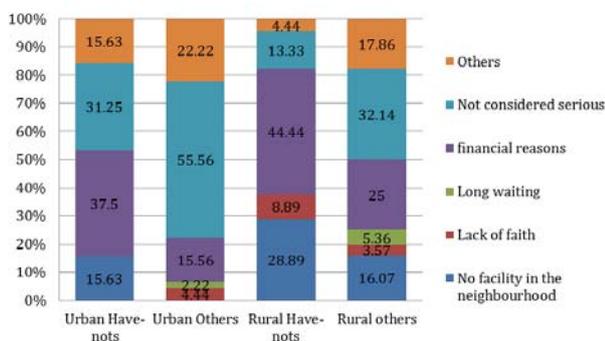
To analyze the healthcare seeking behavior and to propose policy that would be instrumental in improving accessibility, the research framework has been conceptualized to have five steps. *First step* was to analyze the choice of health seekers and the role of attitudinal parameters on the choice. The *second step* was to appraise the supply side dynamics for both rural and urban areas. Following the footsteps, the *third step* was to study the role of companions and the possible consequences on healthcare activity, health seeker and companions. The *fourth step* attempted to determine the parameters that lead to higher satisfaction of the healthcare seekers. Assimilating the findings several policies were proposed, which were further modified to generate scenarios. These scenarios were then used to gather feedback from residents. As the *fifth step*, ‘revisit decisions’ models were estimated to not only highlight the parameters that lead to the selection of the scenario, but also to capture effects of perception of the transportation system and available healthcare infrastructure.

Two sets of field surveys were conducted. The preliminary survey was aimed to obtain healthcare activity diary in multiple prototype spatial scales, namely, rural, suburban and urban. This data were used in step 2

to step 4. The second field survey targeted two groups of respondents, namely, rural residents and health seekers who came to the regional facility in the urban areas. The main objectives of the surveys were to devise policy scenario that might instigate usage of the local public health care facilities and analyze the acceptance of the conceptualized scenarios.

### 3. Choice of the healthcare facility provider for outpatient needs

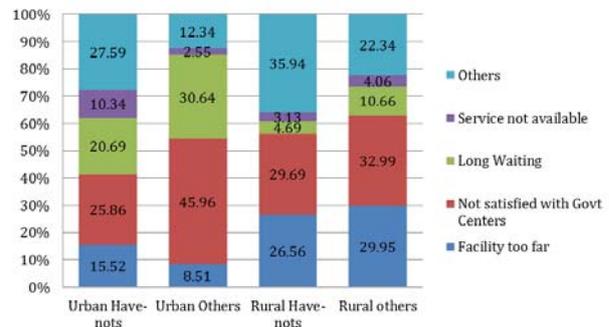
Analysis of the NSS data on Health and morbidity 2004<sup>\*1</sup> revealed that there are five choices, while individuals sought for healthcare, public providers, private providers, medicine shops, traditional medicine, and consultation with well-wishers. Additionally, the sixth undesired event of ‘do-nothing’ i.e., avoiding healthcare activity. Based on the segmented logistic regressions, it was observed that as the number of days of illness increased (parameter depicting perceived seriousness); people tend to opt for diagnosed treatment services. The household size did not seem to play a vital role. However, household structure when interacted with education levels, displayed significant impact on choice behavior. The lesser-educated household did not seem to choose the private services. However, causal models highlighted that previous visit experience to the public HFs induced the shifting of preference towards private healthcare service providers. Notwithstanding price, sensitivity among poor was observed to be critical and determining. Traditional medical systems run parallel & were chosen by the individuals, for whom faith transcends socio-economic or demographic differences.



**Fig.1 Reasons for not availing any health service at all (in per cent)**

In case of the rural areas of West Bengal, India, the lack of HFs is evident. In case of rural have-nots, around 29% of the respondents did not opt for any service, as there was no HFs available. This clearly depicts a supply

gap in the rural areas, which is further supported by the similar observations from the rural others (16%). Financial constraints however have two distinct components (1) cost of healthcare and (2) cost of travelling to the HFs.



**Fig. 2 Reasons for not availing public health facilities (in per cent)**

In the urban areas, the service delivery efficiency was comparatively better than those in the rural area. Therefore, attracted considerable number of health seekers from the adjoining hinterlands especially the have-nots. This generated excessive load, chaos and induced high waiting time and delay in service delivery. Middlemen engaged in corruptive activities often lured health seekers and their families of bypassing the chaos and speeding up the process in exchange of financial gains.

### 4. Effects of self-belief, attitude and previous experience on the choice of healthcare facility

The accessibility impedance seemed to be a deterministic parameter in case of utilization of the public HFs irrespective of socioeconomic classes. Unavailability of certain services or public HF as a whole, and lack of service delivery quality induced tendencies of leapfrogging to regional multispecialty facilities. The weaker section of the rural India seemed to suffer the most, in addition to economic constraints, the location of the houses were in the interior parts adjoining the agricultural lands which were not always connected by all-weather roads and mostly non-negotiable using four wheelers, therefore, connectivity was a major cause of concern as well. This not only depicted the gap between the rhetoric and reality but also on the framework within which the policies have been formulated, without due consideration of real time connectivity; the network connectivity and the persevering infrastructure drawbacks affected accessibility largely.

Negative perception about the non-spatial exogenous factors (such as long waiting time, delay in service delivery, nonoperational condition of the medical equipment) governing the public HF often prompted the health seekers to seek for other alternatives. The perceptual endogenous parameters (such as previous experience at the public HFs) had a significant role in the choice behavior and often-negative perception about the public HF prompted choice of private facilities.

### 5. Availability of HFs: Supply Side Analysis

In the case of India, there is a distinct hierarchy of service providers in terms of scale, facilities and management. G5 and P5 are the regional healthcare institutions housing multispecialty treatment facilities, mostly located in the urban areas. P3, P2 and G3 are the neighborhood level facilities. Where G represents public/governmental facilities and P represents private facilities.

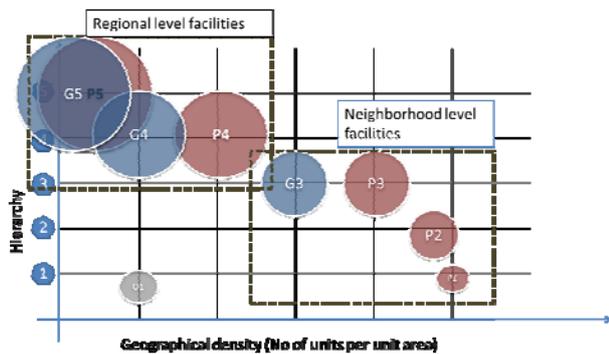


Fig. 3 HFs in India

#### 5.1 Study Area

We analyzed both rural and urban health care facility and service delivery system. A cluster of villages in the West Midnapore District in the state of West Bengal India was selected as the rural study area. The metropolitan city of Kolkata (including Salt Lake City), Howrah city and urban areas of Midnapore city and Kharagpur city was selected as the urban study area.

#### 5.2 Analysis and results

The analysis of the rural areas highlighted the need for all-weather connectivity. Additionally it was evident that there is a need to increase the service delivery capability in the rural HFs. Considering topography and land cover inclusive of population density catchments, the analysis revealed that considerable amount of the catchment populations were not covered (see fig.4).

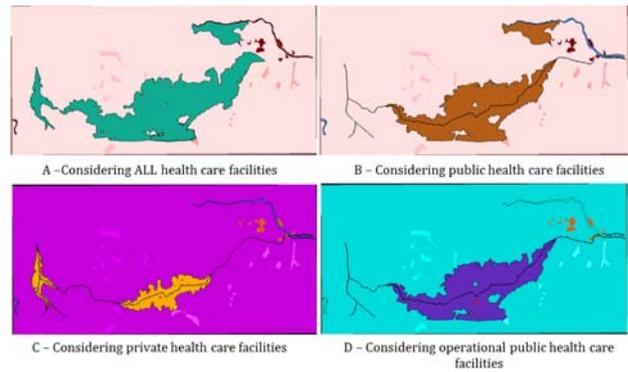


Fig. 4 Catchment area of HFs in rural study area

We identified gap in terms of supply, when the catchment is delineated in terms of mobility impedances (modes available, current usage of public transportation system and life style of the residents). Simulating the current public HF with increased number of hours of operation and service outlets (increased in terms of numbers of doctors and health personnel) at the local public PHCs showed considerable improvement in catchment areas.

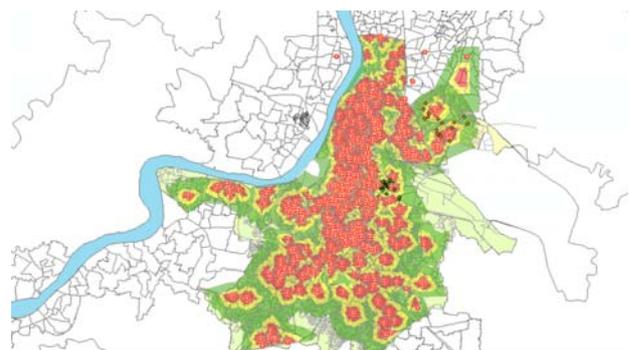


Fig. 5 Potential catchment area of the HFs in urban areas w.r.t. 1 and 2 Km of network distance

The urban areas on contrary are less susceptible to the issues of availability; instead, there is plethora of choices. However, the survey conducted showed that availability did not ensured usage. It was observed that people often travel beyond their neighborhood for healthcare seeking activity that suits and fulfill their needs (see fig. 6).

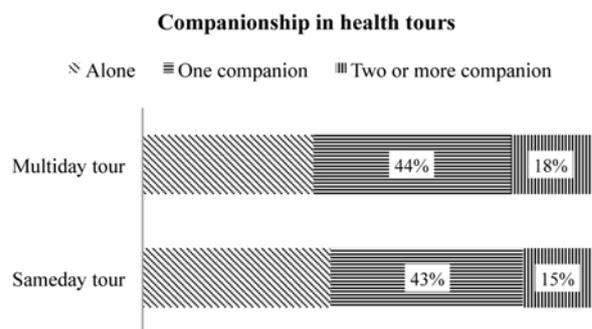
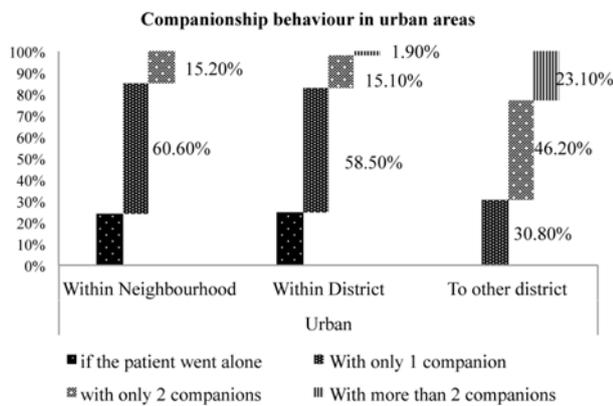
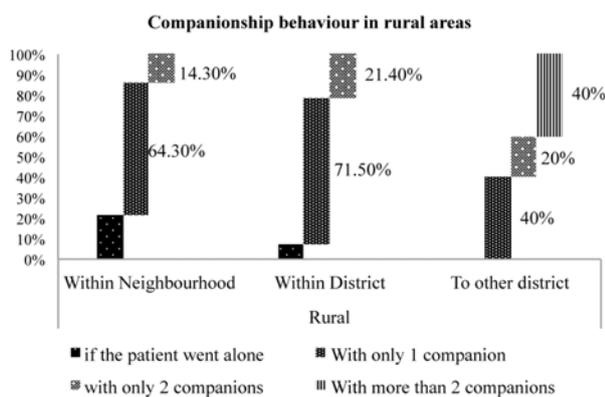


Fig. 6 Healthcare seeking travel pattern and adaptations

## 6.0 Adaptations to engage in healthcare seeking activity



**Fig. 7 Companion count and destination choice of the urban residents**



**Fig. 8 Companion count and destination choice of the rural residents**

As shown in fig. 7 & 8, companionship and inter and intra household collaborations are observed in out of neighborhood health tours. Therefore, analysis of the supply scenario alone is incapable of ensuring accessibility, so psychometric analysis of the demand side was assumed to hold the key.

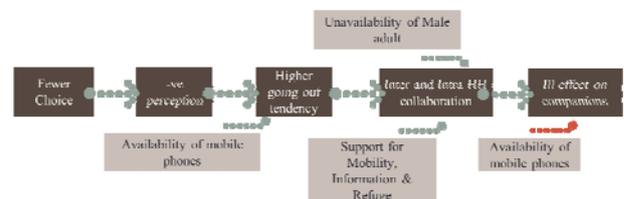
### 6.1 Adaptations: Significance of companions

Diversified household structure and respective social networks played critical role in the interaction and collaborated during health tours. Household members, relative, friends, neighbor and community have different roles and assists in form of different supports. Although companionship is mostly featured as 'altruism', detailed survey and analysis revealed several purposes.

- Altruism – Accompanying the sick, just on the humanitarian grounds
- Seriousness of illness – based on the seriousness of illness, companion's aid in health activity

- Travel impedances – Based on the choice of the HF, the distance and travel time differs. Moreover, modal changes and differences in waiting time while availing different modes, increases dependency.
- Information – In case of regional tours, often health seekers or their family members seek for companions for the information and appointment fixation at the desired HF
- Intrinsic characteristics of HFs – several attributes that increases dependency such as
  - High waiting time,
  - Defunct diagnostic facility often increases the need to travel to other HF for services
  - Uncertainty of availability of required health service - that triggers further search of desired HF.
- Need for medicine and other allied medical support – As reported by the respondents, people expect that they might be asked to buy medicines and other allied medical equipment, instead of being supplied by the HF (especially, public facilities)
- Refuge – More than often, especially in case of regional tours, when people travel from long distances, due to mismatch of operation hours of the HFs and the transportation system, people have to look for shelter in the city, post health activity. For those affordability is an issue, people are often let to spend the time illegally in the hospital premise. In this regard, those who have relatives or friends in the city, often tend to seek for help.

Segmented causal models exhibited that in general, companions play support in terms of information, accompaniment and in travel, but in case of regional tours, support in terms of refuge is highly sought after.



**Fig. 9 Causal model illustrating adaptation behaviour**

Furthermore, the models showed that increased companionship resulted in higher satisfaction of the health seekers. On the contrary, economic loss (wage loss) due to companionship is an unwanted effect, which was significant in case of the have-nots.

## 6.2 Effects of out of neighborhood healthcare tours

Ability to adapt although enhanced the satisfaction of the healthcare activity, but triggered unwanted effects on the well-wishers and increased out of pocket expenditure as well. This research demonstrated that accessibility impedances did not affect the ill alone, but also those associated with them. Economic loss due to companionship is an unwanted effect that commonly affects the poor, and to avoid such incidents there are cases where there is delay in availing health services for the patient. In some cases, the seriousness of illness increase and it became critical. The research establishes that it might be noteworthy to take into account the following in future researches. Firstly, to devise a comprehensive framework to reduce the dependency and regional tours, and secondly, redefining the prospective role of ICT which can surrogate dependency and ease the process of referral.

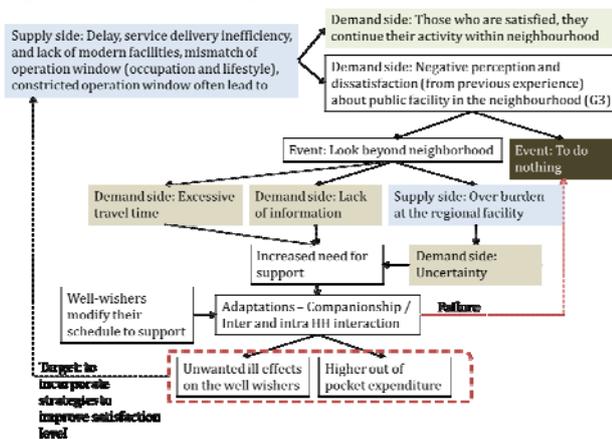


Fig. 10 The healthcare seeking behaviour and its fallouts

## 7.0 Analyzing satisfaction of the outpatient healthcare activity

The variation in the satisfaction of health seekers availing different HFs for outpatient needs, has been analyzed to formulate strategies to upgrade of the existing public HFs sensitive to people's capability and attitude (tailored solution depending on local needs) to improve user ship and reduce regional tours. Multi-level ordered probit models were estimated to determine parameters that have positive and significant effects on satisfaction levels. Parameters such as HFs having modern services, referred HFs and those on the route to the daily activity were positive and statistically significant. Moreover, availability of HFs essentially did not corroborate utilization<sup>8)</sup> without essential upgrade, new facilities would be potentially underutilized. The default growth of private HFs<sup>9)</sup> has a close connection with the aspiration of the people to visit HFs with modern

amenities.

## 8.0 Proposed policies and scenarios

Four major policies that were proposed were based on the integrated findings of the preceding steps.

### Scenario 1–Upgrade of public healthcare facility

The term 'upgrade' is defined as the - Availability of full time doctor, nurses and other required staff with increased operation time window and number of outdoor facilities; the health facility would have basic laboratory and diagnostic facility, ambulance and other emergency transfer facility, and basic medicine.

Objective: (1) to strengthen the existing public facility and (2) to improve opportunity within the neighborhood

### Scenario 2 –ICT based telemedicine services in the public HFs

Objective: (1) To reduce the necessity of health related travel at source and (2) to access specialized medical personnel or referred facility

### Scenario 3 – Allocation of free mobility scheme (if the respective HF desires to refer to other HFs)

Objective: (1) to promote travelling only when it is necessary, and (2) to reduce sidestepping of the local facility.

### Scenario 4 – Development of healthcare emergency service with basic facility

Objective: (1)To address life threatening health service during the non-operation hours and (2) to reduce the need of emergency and uncertain travel especially during night

These policies were then presented singular or in combination to the study groups.

## 9.0 Acceptance of the scenarios - Appraisal

Integrated choice and latent variable models were estimated to elucidate the importance of the psychometric variables depicting the gaps in available health infrastructure and travel condition in tandem to the choice of the scenarios. Perception based assessment was assumed to be instrumental in suggesting the tailored solution that can instigate ' revisit to the neighborhood public HF (G3)' and might be an appropriate approach towards reducing inaccessibility and channelize benefits to all.

Considering current socio-demographic dynamics of the rural and urban areas in India, there is tendency of down scaling of household size and increase in the couple households especially couple elderly households. Considering the importance of healthcare accessibility and the current healthcare seeking behavior and the allied

needs for support, the location priority approach clearly indicate implementation of ‘upgrade and emergency service’ in the local public HF.

This would not only improve the viability of the neighborhood facilities, but would also make these neighborhoods inclusive in nature. Policy variable incorporated in these models depicts gaps in two aspects. Firstly, the transportation system, which was evaluated with respect to four observed parameters, namely, travel time, cost, flexibility and condition. Change in all these observed policy variables, might have a significant effect on the satisfaction of the residents. This model depicted considerable dissatisfaction with respect to travel condition and flexibility, which signifies need for augmentation of road infrastructure and improve connectivity together with provision of additional modal availability aiding transportation system as a whole. Secondly, the available health care infrastructures have been assessed with respect to the observed psychometric parameters such as perception about the available HF, variety of diagnostic facility, price and operation time. The dissatisfaction about the variety and operation time clearly denotes the need for reassessing both the criteria. Movement patterns of the people also show that choice beyond neighborhood has a close relationship with the higher LOS, which essentially have a higher verity and large operation window as well.

Therefore, this approach could be instrumental in not only assessing people acceptance of policies and scenarios, but also assessing the conditions that lead to the choice of the scenarios.

### 10.0 Conclusion

In case of developing nations like India, building new infrastructure has been the key strategy to ensure accessibility to HFs – Perception and people’s need has often being neglected. From supply side point of view, availability of HFs (public and private facilities), in case of both rural and urban areas was not found to be a critical determinant. Although, it was found that in spite of availability, people tend to ‘do nothing’ or bypass local facility (PHCs) if it did not satisfy their needs with respect to:

- (1) Socio-economic and endogenous characteristics of the health seekers conditions;
- (2) Self-belief and perception about the available facilities, in tandem with previous experiences;

(3) Inconvenient and insufficient operation time window of the public outdoor facilities in PHCs (G3)

Fig. 11 shows the framework determining the travel patterns and their corresponding effects. This behavior often adds on to higher impedances, which people overcome through adaptations such as companionship and excessive out of pocket expenditure. Disaggregated analysis showed that dependency lead to inter and intra HH collaborations to organize supports in terms of mobility, information, refuge and uncertainty. Therefore, occurrence of companionship in India is a general phenomenon and availability of companions is a key resource that affects the choice and healthcare seeking behavior of the health seekers. It was evident from the analysis that physical accessibility, affordability, and perception are critically interlinked and determining factors affecting healthcare seeking behavior and activity.

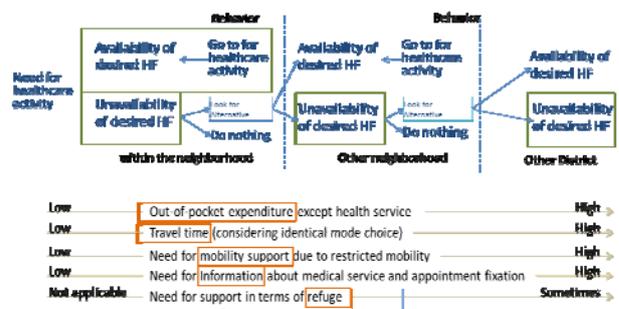


Fig. 11 Interaction between demand and supply

Availability of mobile phones certainly improved inter personal communications and lowering of unwanted issues of wage loss, however, the application of such technologies have limited application in healthcare activity. Furthermore, considering the parameters affecting the satisfaction of the health activity itself, referral system and modern facilities needed to be incorporated in the scenarios. Therefore, it was deemed that improvement in PHCs (G3) could be a key strategy to improve accessibility and user-ship, which lead to the designing of four tailored solutions with respect to the location based objectives or facility based objectives. Considering the current dynamics of low HH size, future strategy should be developed, therefore, implementing ‘emergency services’ is a requirement.

The goal of improvement of accessibility to HFs might be achieved through multi sector strategies. Perception about the local facility together with the allied infrastructure should be considered and therefore, the

strategies should be devised based on people's perception and needs. The acceptance of the strategies depicted that if people centered policies are devised and if users are induced in the planning process, the likelihood of the success of the goal is much higher. This research highlighted several impedances and adaptations that people undertake to counter them. It seemed necessary to reduce these impedances such that these might improve trustworthiness of the public HFs.

### 11.0 Limitations and outlook

In spite of several meaningful findings elaborated in previous sections, there are several limitations pertaining to social context, intermixing of purposes, and behavior pertaining to diagnostic setup and diagnosed criticality. Some of these limitations are elucidated in the following section.

Demographic - No health seekers below the age of 18 were considered.

Social Texture - Effects of caste and religion has not been considered.

Geographical texture - Although different typology of geographical conditions have been considered and studied, yet considering the geographical diversity of India, further detailed variations needs to be considered.

Intermixing of social and health purpose – Analysis revealed several possibility of intermixing of purposes, such as healthcare activity on the route to mandatory activity, companionship to urban areas with a intention of retail and shopping activity in the urban areas, and importantly, intermixing of social visit to the friends and relatives in urban areas with healthcare visits. These variations might be affecting the overall usage patterns of HFs.

Social cost of the scenarios - The social cost of developing the proposed scenarios has not been estimated. This remains a future task to incorporate social cost benefit analysis in order to appraise policy scenarios.

Space-time accessibility measures - Space-time accessibility measures could be developed for measuring the accessibility to the HFs with respect to the variation of the operation time of different service providers with respect to the life style and occupational commitments of the users.

While researching about the locational, allocations and usefulness of the social infrastructure, one part that is

mostly ignored is the role that the social infrastructure plays during emergency irrespective of manmade or natural disasters. The capacity and location of these social facilities becomes critical. Therefore, it might be prudent to develop methodology to assess and estimate the location with respect to disaster sensitivity as well.

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### Notes

\*INSS is a division in Ministry of Statistics and Programme Implementation, Government of India (GoI), responsible for socio-economic data collection, analysis and dissemination.

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