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What influences the people's trust on public healthcare system in Bihar, India? A mixed methods study

Atul Kumar^{1,2}, Edukondal Palle¹, Prakash Babu Kodali^{1*} and Kavumpurathu Raman Thankappan^{1,3}

Abstract

Background Lack of trust in healthcare systems results in underutilization, non-adherence to medications, poor healthcare outcomes, and catastrophic health expenditure. Literature on people's trust on public health care system is limited in India. This study aims to examine the people's trust in public healthcare system in Bihar and explore the factors influencing it.

Methods We conducted the study employing a sequential explanatory design. A door-to-door survey of 360 adults (mean age 45 years, men 65%) selected through multi-stage random sampling from two districts of Bihar was conducted employing "public healthcare system trust scale". It was followed up with 16 in-depth interviews of purposively selected respondents with a low-level of trust. Survey data were analyzed using binary logistic regression analysis and adjusted odds ratios (AOR) were computed. Qualitative interviews were analyzed employing thematic analysis.

Results Majority of the participants (76.1%; 95% CI = 71.5–80.3) had low level of trust in public healthcare system, and 27.2% (CI = 22.8–32.0) preferred public healthcare service providers. Younger age of up to 45 years (AOR = 5.68, 95% CI = 2.61–12.37, $p < 0.001$), residing in East Champaran district (AOR = 7.61, 95% CI = 3.67–15.77, $p < 0.001$), and suffering from chronic disease (AOR = 2.47, 95% CI = 1.09–5.61, $p = 0.037$) were significantly more likely to report a low-level of trust in public healthcare system. Thematic analysis yielded six themes namely i) inadequacy of health services, ii) poor quality of services, iii) poor health systems process and management, iv) lack of trust building dialogue, v) previous negative experiences with public facilities and, vi) corona virus disease (COVID)-19 eroding trust on healthcare system.

Conclusion People's trust on public healthcare system in Bihar is low. Public health care system in the state needs to improve focusing on adequacy, quality, health system process and management and trust building dialogue.

Keywords Health systems, Primary health care, Patient provider interaction, Trust

Background

Trust is an essential part of healthcare process and serves as basis for provider-patient interaction [1]. It is defined as *"an optimistic acceptance of a helpless situation where the trustee (patients) believes that the trustor (doctors) will care for their concern or interest"* [2]. In healthcare settings, the concept of trust encompasses the characteristics of interpersonal trust (i.e., patient trusting the provider) and social trust (i.e., patient trusting health-care system as an institution) [3]. Trust mediates patient's

*Correspondence:

Prakash Babu Kodali
prakashkodali@cukerala.ac.in

¹ Department of Public Health and Community Medicine, Central University of Kerala, Kasaragod, Kerala, India

² Department of Physical and Rehabilitation Medicine, Post Graduate Institute of Medical Education & Research, Chandigarh, India

³ Department of Public Health, Amrita Institute of Medical Sciences, Kochi, Kerala, India



health-seeking behaviors, treatment adherence, life-style changes, and health outcomes [4–6]. Low levels of trust in healthcare systems are known to increase the risk of treatment avoidance and dropout [6–8]. Given that public healthcare systems play an important role in health service delivery providing primary, secondary, and tertiary care services, trust in public healthcare systems is crucial to improving healthcare utilization, achieving key health targets, and ensuring financial risk protection [6, 9, 10].

Literature from developing countries reported varying levels of trust on public healthcare system and key factors which influence it. In Sri Lanka, it was found that the presence of competing private healthcare providers negatively influenced the trust on public health systems [11]. Another study from Thailand found that trust in public health systems is generally declining due to private practice from within the system [12]. Kane & Calnan (2017) believe that the health system's failure leads to an erosion of trust in the medical profession [13]. The National Sample Survey (NSS) in India identified that only 18% of people went to public health facilities when they fall sick, whereas 65% preferred to go to private doctors for treatment [14]. Among adults aged 45 years and above, only about one-fifth of outpatient care was sought in public healthcare facilities, while the private healthcare facilities cater to approximately 60% of outpatient care [15]. These differences clearly show that in India, people prefer private health facilities suggesting that people's trust in the public healthcare system remains low [16–18]. The recent episodes of vaccine hesitancy towards corona virus disease (COVID)–19 vaccines, can be traced to vaccine confidence gap attributable to low level of trust in public healthcare system [19–22]. Evidence suggests that poor quality of care, lack of facilities, and unfavorable experiences diminish trust and hinder households from utilizing care from public healthcare facilities [23].

In the last two decades several strategic initiatives were undertaken by Government of India to improve the trust in public healthcare system. The National Rural Health Mission launched in 2005 revitalized the exiting primary healthcare system through architectural corrections, and increased investments [24, 25]. The National Health Policy 2017 envisioned at reinforcing trust in public healthcare system by making it predictable, efficient, effective, affordable, and patient centric [26]. Subsequently, the Ayushman Bharat Programme upgraded the existing Sub-Centers and Primary Health Centers to Health and Wellness Centers (HWCs) enabling them to provide a broader spectrum of comprehensive primary healthcare services [27, 28]. Evidence across Indian states report that healthcare facilities with assured provision of broader package of quality healthcare services better harmonized

with continuum of care across secondary and tertiary levels garner higher public trust [29–32]. However, the public healthcare service utilization in Bihar is not in line with its population density and available healthcare infrastructure. While Bihar accounts for 9.3% of India's 1.4 billion population, and 6.14% of the 0.167 million functional HWCs, the total HWC footfalls in Bihar account for only 2.4% of total HWC footfalls in India [33]. A 2021 study based on fourth round of National Family Health Survey (NFHS-4) reported a high prevalence of forgone medical care for pediatric illnesses like fever/cough (41.7%) and diarrhea (44.3%), and essential maternal care components of antenatal care (41.8%), and institutional delivery (33.7%) in Bihar [34].

By 2025, India aims to increase the utilization of public healthcare facilities by 50%, and decrease out of pocket expenditure (OOPE) by 25% [26]. Building trust can be argued to play a key role in achieving national and international targets towards betterment of health, improving patient outcomes and protecting from catastrophic health expenditures [1, 2, 35]. Understanding the trust on public healthcare systems, and identifying the key factors which influence it can provide crucial insights to improve the public's trust on public healthcare system in India and there is limited research examining the same. This study fills this critical research gap and aims to address the following objectives:

- To assess the people's trust in the public healthcare system in two districts of Bihar.
- To identify the factors associated with trust in the public healthcare system in Bihar.
- To explore the factors influencing trust deficit on the public healthcare system in Bihar.

Methods

Study design

We conducted this study employing a sequential explanatory mixed methods design [36]. We conducted an initial quantitative phase as a door-to-door cross-sectional survey wherein the level of trust on public healthcare system, and the associated factors were identified using a questionnaire. The subsequent qualitative phase employing a phenomenological approach involved in-depth interviews, with a subsample of participants from initial quantitative phase were interviewed to further explore the factors influencing trust on public healthcare system.

Study area and study population

The study was a community-based study conducted in two districts (East Champaran and Patna) of Bihar. The districts were randomly selected based on NITI Aayog's Multi-Dimensional Poverty Index (MDPI) report 2021,

Fig. 1 Sample selection process

a low-level trust in public healthcare system were purposively sampled for the qualitative phase. We employed a purposive sampling approach with maximum variation including the participants from both the districts, rural and urban areas, males and females and those with different health status, and previous experience of using healthcare in public and private sectors.

Data collection tools and techniques

The survey data were collected employing a pre-tested structured questionnaire administered by visiting the households of the participants. The questionnaire consisted of close-ended items across two sections, the first section with self-prepared items capturing socio-demographic status, health status, and healthcare utilisation (see supplementary file 1), and a second section comprising of the public healthcare system trust scale. The public healthcare system trust scale employed in this study was developed and validated in Indian settings by Anand & Kutty (2015). The scale has 23 five-point Likert type items with responses ranging from strongly disagree (scored as 1) to strongly agree (scored as 5). The public healthcare system trust was computed as a composite index of the 23 items, with higher scores indicating a higher level of trust. The potential range of composite score for public healthcare system trust scale was from 23 to 115. The scale composed of two sub-scales i) a sixteen item sub-scale on healthcare provider trust, and ii) a seven item sub-scale on healthcare institution trust. The scale has a good internal consistency (Cronbach's alpha: 0.86) and test-retest reliability ($r=0.97$, $p<0.05$) [3]. The scale and the item wise responses obtained are provided in supplementary file 2. To collect the qualitative data, we developed a semi-structured in-depth interview guide with eight open-ended questions (see supplementary file 3). The questions captured the experiences of participants on various domains concerning trust on public health system. The domains explored included i) individual experiences and situations which eroded trust in public healthcare system, ii) influence of trust on health seeking behaviour, iii) COVID-19 impact on healthcare system trust, iv) qualities of healthcare providers, and healthcare systems which would make them trust worthy, and v) potential strategies to improve trust. The data collection tools were translated into Hindi, and back translated to check for consistency. The authenticity of the translations was verified by a third party who was not part of the study.

Data were collected during March to July 2022. The quantitative data collection was done as a house-to-house survey. The selected participants were given the questionnaire to fill. In cases where the participants were illiterate, researcher asked questions and filled the questionnaire after getting response from the participant. The

questionnaire was administered after obtaining informed consent. The entire process took up to thirty minutes per person. At the end of the survey, the participants were asked if they are willing to participate in the subsequent qualitative phase. Among the participants who agreed, respondents for the qualitative phase were sampled purposively. The qualitative data were collected employing face to face in-depth interviews. The first author who was a male paramedical graduate and resident of Bihar conducted the door-to-door survey, in-depth interviews and took field notes. During the data collection period, the first author was an MPH candidate and was trained in quantitative and qualitative research methods involving prolonged interaction with community members. The in-depth interviews were conducted in vernacular language by the primary author at the participants' home. The interviews were audio-recorded with a prior consent from the participants. If the respondent did not agree to the recording of the interview, notes were taken. The average duration of each interview was 40 min with interviews ranging for a minimum of 27 min up to a maximum duration of 78 min.

Data analysis

The quantitative data were entered, cleaned, and analysed using Statistical Package for Social Sciences (SPSS), version 27.0. The item-wise responses of the 23 items of "public healthcare system trust scale" were summed to yield a composite score ranging from 45 to 115. The minimum value of the composite score in our study was higher than potential minimum value of 23, as no participant reported "strongly disagree" across all the 23 items in the scale (see supplementary file 2). While there is no standard cut off to designate public healthcare system trust into high and low levels, higher scores indicated higher trust [3]. Further, the composite score of public healthcare system trust was not normally distributed (p-value of Kolmogorov Smirnov Test <0.001). In this regard, to facilitate the analysis and report the level of trust we categorised the trust score into two categories "low" and "high level" employing the class width. The class width (C) of the composite score of public healthcare system trust was calculated employing the following formula

$$C = \frac{\text{Maximum Value} - \text{Minimum Value}}{\text{Number of desired class interval}}$$

where the maximum value was 115, minimum value as observed in the study was 45, and desired number of class interval being two. Further the cut-off scores were computed as follows.

$$\text{Range of score for low level trust} = \text{Minimum value} + C$$

$$\text{Range of score for high level trust} = \text{Maximum score for low level trust} + C$$

Employing class width, we categorised the score of 45 to 80 into “low level” and 81 to 115 as a “high level” of trust. Similar approaches of categorising composite index were reported in earlier studies [40, 41]. There was no missing data, or data entry errors. The statistical analysis was carried out employing univariate, bivariate and multivariate analysis. The proportion of individuals having low and high level of trust on public health system was assessed employing frequencies and percentages. The factors associated with people’s trust on public health system were identified employing binary logistic regression. Adjusted odds ratios (AOR) and 95% confidence intervals were calculated as measures of association.

We analysed the qualitative interviews employing a thematic analysis approach according to the framework approach given by Braun and Clarke (2006) [42]. The interviews were first transcribed to Hindi and translated to English. The English transcripts were back-translated to ensure consistency with the original Hindi versions. The transcripts were first familiarised by reading and re-reading. The interviews were coded inductively, and deductively (based on the findings of quantitative phase) by developing descriptive and process codes using NVivo-12. Two authors independently reviewed the codes to ensure consistency with the interview data. The generated codes were collated to develop themes.

Results

Characteristics of study participants

In quantitative phase we surveyed a total of 360 participants from two districts of Bihar. The characteristics of study sample participants are given in Table 1.

Trust in public healthcare system

The trust in the public healthcare system was categorized into high and low levels. It was observed that 23.9% of the participants had high level trust in the public healthcare system, and 76.1% had a low level of trust. In the sub-scale analysis, we found that 23.3% had high trust in the public healthcare provider, and 25.8% had high trust in the public healthcare institution. The detailed specifics of the same are given in Table 2.

Factors associated with trust in public healthcare system

Younger age of up to 45 years (AOR=5.68, 95% CI=2.61–12.37, $p<0.001$), residing in East Champaran district (AOR=7.61, 95%CI=3.67–15.77, $p<0.001$),

and suffering from chronic disease (AOR=2.47, 95% CI=1.09–5.61, $p=0.037$) were significantly more likely to report a low-level of trust in public healthcare system. Additionally, health worker visits, distance from nearest health facility, and facing difficulties in accessing healthcare facilities were also associated with trust on public healthcare system. The detailed specifics concerning the same are reported in Table 3.

Qualitative results

The thematic analysis of interviews yielded six themes explaining the participant’s low level of trust in public healthcare system. The themes included i) inadequacy of health services, ii) poor quality of services, iii) poor health systems process and management, iv) lack of trust building dialogue, v) previous negative experiences with public facilities and, vi) COVID-19 eroding trust on healthcare system. The interplay of identified themes is represented in Fig. 2.

Theme 1: inadequacy of health services

Participants felt that the public hospitals in Bihar lacked basic essential facilities to provide acceptable quality of healthcare. Shortcomings such as unavailability of health workers, shortage of laboratory facilities, infrastructure, beds, Oxygen and medicines were reported by the participants.

“There is a government hospital near to my home but there is no permanent doctor here and the nurses also do not come most of the time. The hospital building is in a very bad condition.... Nobody cares for patients there. This is the reason I don’t go there to seek treatment.” (P-5).

The shortages of drugs and other essential supplies in the hospitals resulted inefficiencies in healthcare delivery. The participants were of a general opinion that seeking healthcare is a “waiting game”. One of the participants reported the following.

“There are no facilities available. In everything there is long queue, dhaka-mukki (scrimmage). You go to any public hospital. They will prescribe the same medicine for any condition” (P-2).

Theme 2: poor quality of services

The general quality of services provided at the public health facilities were reported to be poor. Citing from their own experiences, participants reported that nobody

Table 1 Study Sample characteristics (n = 360)

Variables	Frequency	Percentage
Gender		
Female	125	34.72
Male	235	65.28
Age group		
Up to 45 years	195	54.17
46 years and above	165	45.83
Place of residence		
Rural	200	55.56
Urban	160	44.44
District		
East Champaran	180	50.00
Patna	180	50.00
Caste		
General	99	27.50
SC & ST	107	29.72
OBC	154	42.78
Religion		
Muslim	55	15.28
Hindu	305	84.72
Education Level		
Up to primary education	218	60.56
Secondary education and above	142	39.44
Current Employment status		
No	146	40.56
Yes	214	59.44
Income Status		
Above Poverty Line	109	30.28
Below Poverty line	251	69.72
Respondent suffering from a chronic ailment		
Yes	99	27.50
No	261	72.50
Sought treatment for self/family member in one year preceding survey		
No	227	63.06
Yes	133	36.94
Any household member pregnant in the last one year		
Yes	99	27.50
No	262	72.78
Any household infected by COVID-19 in the last one year		
No	303	84.17
Yes	57	15.83
Covered under any health insurance		
No	238	66.11
Yes	122	33.89
Health worker visits in the last one year		
No	247	68.61
Yes	113	31.39
Distance from the nearest health facility		
Less than 2 km	87	24.17
2 km or more	273	75.83
Faced difficulties in accessing public health facilities		
Yes	164	45.56
No	196	54.44

SC Scheduled caste, ST Scheduled Tribe, OBC other backward classes, COVID Corona virus disease, Km Kilometer

Table 2 People's Trust on Public Healthcare System (n = 360)

	Frequency	Percentage (95% CI)
Trust in Public Healthcare System		
Low	274	76.1 (71.5–80.3)
High	86	23.9 (19.7–28.5)
Trust in Public Healthcare Provider		
Low	276	76.7 (72.1–80.8)
High	84	23.3 (19.2–27.9)
Trust in Public Healthcare Institution		
Low	267	74.2 (69.5–78.5)
High	93	25.8 (21.5–30.5)
Preference of Service Provider		
Public	98	27.2 (22.8–32.0)
Private	262	72.8 (68.0–77.2)

CI Confidence Interval

at the public hospital empathizes in the situation of a health emergency.

“The situation here is, when a patient is brought on emergency, the family members cries and shouts but nobody listens & patients may die if not taken to other places.” (P-1).

Moreover, the emergency response and referral services were often unsatisfactory. The unavailability and non-responsiveness of emergency services, coupled with the practice of receiving bribes jeopardized the trust on public health system.

“Earlier there was no ambulance in the hospital. Now there is one ambulance. But it will never reach you, forget about reaching on time. If you call them, first the line will not connect, if you connect to the line, no one attends the call. Even after attending the call, they will not come. If it reaches on time, you just have to say that we will pay you (jetna paisa lagi, hum de denge) (P-3).

Theme 3: poor health system process and management

The poor management and inefficiencies within the public health system reflected in longer waiting time compromising the healthcare access to poorer socio-economic groups. One of the participants who was a daily wage worker reported the following.

“it becomes very difficult to wait for the whole day to get the treatment. We have to work, otherwise we will not get money. So, we buy medicine from medicine shop or go to private” (P-6).

In addition to the poor management, the distrust on public health system was further exacerbated by

procrastination at work by the healthcare providers, and the favoritism shown to influential individuals.

“For a consultation, you will be standing in queue for hours, but a person with some acquaintances or some influence can get consultation any time jumping the queue no matter how long the queue is.” (P-7).

Theme 4: lack of trust-building dialogue

Poor doctor-patient communication was among the most common issues reported by the participants. Specifically, patients from uneducated and low socio-economic background feel that they do not get an adequate time with the doctor in a public hospital. One patient reported.

“I went to a government hospital. At first the doctor doesn't even talk to me. During the consultation, he doesn't touch my body. He just asks (without getting close) what your problems are. Then prescribes medications, doesn't matter whether these drugs are available in the hospital or not, that's it. He doesn't explain what has happened to me or how long it will take me to get better and if you ask more questions, he will get angry.” (P-8).

Explaining the notion of trust the participants reported that the private hospital doctor is more diligent in listening to the patient, checks the reports, explains the cause of illness, and how to manage them. Such kind of a trust building dialogue was not observed in the public health facilities.

I go to private hospital or clinic, the doctors there listen patiently to all my problems. He explains everything to me clearly. Even after seeing the reports, he explains to me that due to these things you are suffering. It makes me feel satisfied that I go to this doctor. (P-2).

Theme 5: previous negative experiences with public facilities

A negative experience with public health facilities during a health emergency was found to completely erode the trust among the users. Even the patients who were initially preferring public health facilities were pushed to seek care from private hospitals owing to their negative experiences.

“Once I met with an accident, got some fractures. For an x-ray that could have been done in 30 min, it took a whole day. I should have gone to private diagnostic center. Though it could be costlier but it would have been done on time.” (P-9).

Table 3 Factors associated with trust in Public Healthcare System: Results of binary logistic regression analysis ($n = 360$)

	Low level of trust on PHC system (%)	AOR (95% CI)	p-value
Gender			
Female (<i>ref</i>)	71.2%		
Male	78.7%	2.02 (0.97–4.23)	0.062
Age group			
46 years and above(<i>ref</i>)	66.7%		
Up to 45 years	84.1%	5.68 (2.61–12.37)	< 0.001
Place of residence			
Rural (<i>ref</i>)	80.5%		
Urban	70.6%	0.78 (0.37–1.64)	0.510
District			
Patna (<i>ref</i>)	62.2%		
East Champaran	90.0%	7.61 (3.67–15.77)	< 0.001
Caste			
SC & ST (<i>ref</i>)	75.7%		
General	70.8%	0.95 (0.45–2.05)	0.903
OBC	84.8%	3.65 (1.18–11.31)	0.025
Religion			
Islam (<i>ref</i>)	74.5%		
Hinduism	76.4%	0.88 (0.36–2.16)	0.779
Education Level			
Secondary education and above (<i>ref</i>)	77.5%		
Up to primary education	75.2%	1.94 (0.78–4.83)	0.155
Current Employment status			
No (<i>ref</i>)	74.0%		
Yes	77.6%	0.84 (0.41–1.73)	0.632
Income Status			
Above Poverty Line (<i>ref</i>)	76.1%		
Below Poverty line	76.1%	1.23 (0.44–3.44)	0.691
Respondent suffering from a chronic ailment			
No (<i>ref</i>)	75.5%		
Yes	77.8%	2.47 (1.09–5.61)	0.031
Sought treatment for self/household member in one year preceding survey			
Yes (<i>ref</i>)	75.2%		
No	76.7%	2.12 (1.05–4.28)	0.037
Any household member infected by COVID-19 in the last one year			
No (<i>ref</i>)	74.6%		
Yes	84.2%	0.91 (0.33–2.51)	0.860
Covered under any health insurance			
No (<i>ref</i>)	75.2%		
Yes	77.9%	1.36 (0.71–2.61)	0.349
Health worker visits in the last one year			
Yes (<i>ref</i>)	71.7%		
No	78.1%	3.16 (1.50–6.65)	0.002
Distance from the nearest health facility			
More than 2 km (<i>ref</i>)	74.7%		
Less than 2 km	80.5%	4.24 (1.83–9.82)	0.001
Faced difficulties in accessing public healthcare facilities			
No (<i>ref</i>)	67.9%		
Yes	86.0%	6.72 (2.79–16.20)	< 0.001

The dependent variable in the logistic regression model is “Level of Trust on Public Healthcare System” captured as Low and High (*ref*). The outcome category was “Low level of trust”. The binary logistic regression model was significant based on Omnibus tests of Model Coefficients ($p < 0.001$), and had an acceptable model fit according to the Hosmer and Lemeshow Test for model fit ($p = 0.129$)

AOR Adjusted Odds ratio, PHC Public Healthcare System, CI Confidence Interval, KM Kilometers, SC Scheduled Castes, ST Scheduled Tribe, OBC Other Backward Classes, COVID Corona Virus Disease, *ref* Reference Category

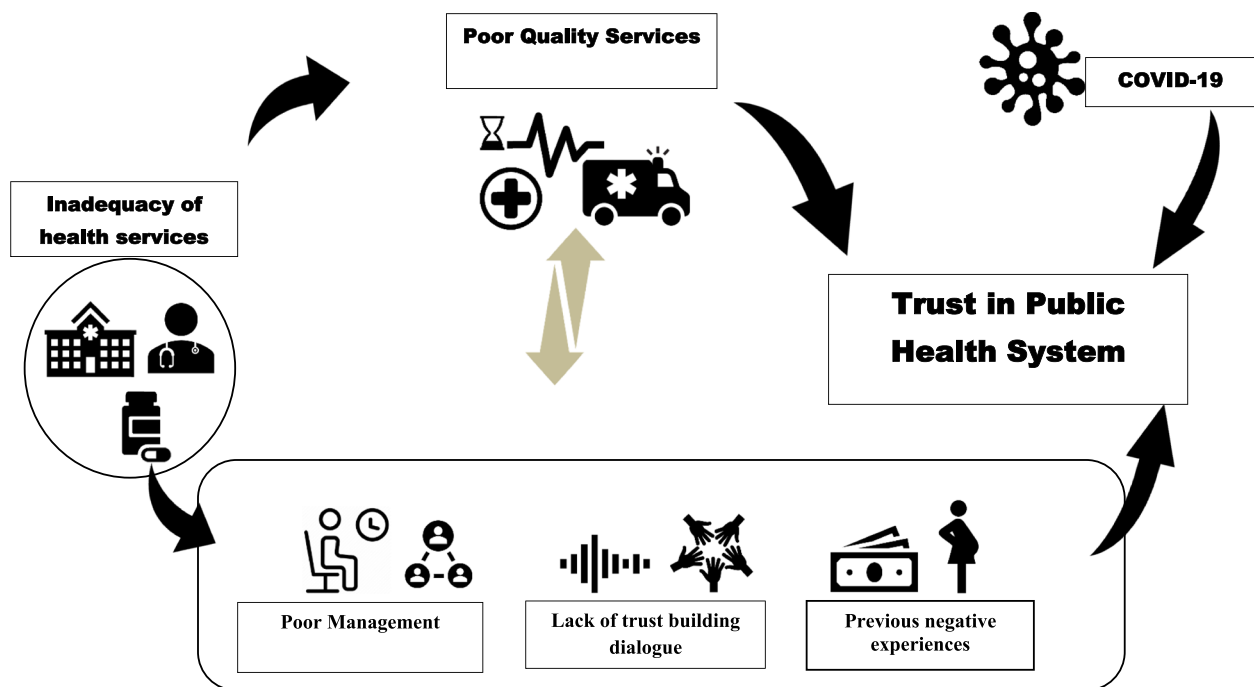


Fig. 2 Findings of the qualitative interviews under various overarching themes

Another female participant from rural area reported the lack of reliability in public healthcare services by citing her relative's experience as follows.

"The nurses and pharmacist gave her some drugs and injection but the doctor did not come. After some time (about two to two and half hours), her condition became unstable. Then they referred her to District Hospital, which is more than 25–30 km away. Ambulance facility was available there but they refused to take us citing that "driver is not there". We then told family members to arrange money, then took her to nearby private hospital." (P-3).

Theme 6: COVID-19 eroded trust on public health system

The participants reported that after COVID-19 they stopped trusting public healthcare system. Specifically, the participants cited the shortage of oxygen cylinders, lack of facilities and health professionals in public hospitals resulting in distrust. One of the participants whose family member was hospitalized for COVID-19 reported the following.

"There were no arrangements in public hospitals, so we took our patient to private. We had time because the condition was not that serious. It could have been serious if we had stayed at a government hospital." (P-3).

In addition to deficiencies in COVID-19-related care, the participants also pointed out the absence of adequate care for other health emergencies in public health systems. The larger impact of COVID-19 on other key health services was observed to be influencing the distrust among non-COVID patients.

"Forget about corona patients; patients with other conditions like burns, accidents, and other emergencies were also not getting any treatment. Health workers didn't check them, fearing they also might have corona. Even when ambulances were called for pregnant ladies, they refused to come..." (P-10).

Discussion

Three out of four participants had a low level of trust on public healthcare system. Younger age, residence in a high poverty district, belonging to other backward class (OBC) communities, suffering from chronic ailment, seeking treatment in the past one year, lack of health worker visits, distance from nearest public healthcare facilities, and experience of difficulties in accessing public healthcare facilities impacted the trust on public healthcare system. Qualitative interviews complemented the survey findings wherein i) inadequacy of health services, ii) poor quality of services, iii) poor health systems process and management, iv) lack of trust building dialogue, v) previous negative experiences, and vi) COVID-19 were

major factors contributing to limiting trust on healthcare system.

Previous studies in India reported the lack of trust on healthcare system to be around forty percent. Sharma et al., (2017) reported that 41.74% of tuberculosis (TB) patients seeking treatment from private providers reported lack of trust on public healthcare system [8]. Vora et al., reported that a third of low-income households requiring surgical care did not seek care due to lack of trust [43]. Our finding of 76.1% having a low level of trust is higher than the previous studies. The difference could be attributed to the comprehensive nature of our trust measure (i.e., studying overall public healthcare system trust, rather than trust in specific disease/clinical setting), geographical differences (previous studies were in urban areas of Delhi and Ahmedabad), and the timing of the study (i.e., during the COVID-19 period). A 2017 meta-analysis reported that trust on healthcare system is subject to societal differences, care settings, and larger social, cultural, and political processes [44].

The participants from the high poverty district (i.e., East Champaran) had a 7.61 odds of low level of trust on public healthcare system compared to residents of Patna a low poverty-headcount district. Earlier studies reported varying levels of trust across the countries and communities with developing countries and vulnerable communities having a higher level of distrust [45–48]. This could be further translating to lower healthcare utilization, as NFHS-5 indicate that only 61.5% of mothers had institutional delivery in East Champaran, compared to 89.1% mothers in Patna [49]. Further the differences in trust and healthcare utilization can be explained in inadequacy of healthcare services, poor quality of services, and poor health systems processes and management. A 2017 report by Harvard TH Chan School of Public Health highlighted the infrastructural deficiencies and in-efficiency in translating the resources to sustainable healthcare investments in Bihar [50]. Also, research from other Indian states report that healthcare system's inadequacies (such as infrastructural issues, poor quality services, and poor processes and management) co-occur with distrust on public healthcare systems [51].

Participants from the Other Backward Class (OBC) communities are more prone to not trust the public healthcare system compared to those from Scheduled Caste (SC) and Scheduled Tribe (ST) communities. SC & ST are considered to be most socially and economically vulnerable communities in India and are known to have lower consumer expenditures than the OBCs [52]. Due to limited options to utilize healthcare from private providers, SC/ST households may have a higher trust in public healthcare system. The literature also points that

individuals from poor socio-economic strata seek care from public hospitals compared to their richer counterparts [53].

Having a healthcare facility within a radius of two kilometers, currently suffering from a chronic disease, and facing difficulties in accessing the public healthcare facilities is associated with low trust on public healthcare system. The proximity to healthcare facility can potentially impact public healthcare system trust in either of the two ways i) proximity to private healthcare facilities resulting in preference to private providers, and ii) proximity to resource constrained public healthcare facilities negatively impacting the trust. Previous literature reported that households in Bihar have a high private healthcare dependence [54]. Also, shortage of doctors, medicine shortage and long waiting hours are some of the key areas to focus. Bihar is among the only three states with an average rural population covered per sub-center to be greater than 7000 [55]. The 2021 rural health statistics indicates a shortfall of 32.7% doctors and 87.3% specialists (i.e., Surgeons, OB&GY, Physicians & Pediatricians) in rural primary health centers and community health centers respectively [55]. Our finding suggests that when faced with difficulties in accessing services, proximity to healthcare facilities do not necessarily translate to better trust. Low level of trust among individuals suffering with chronic diseases hint towards under preparedness of public healthcare systems in Bihar to manage chronic diseases, particularly non-communicable diseases (NCD). Earlier studies as well reported on lack of infrastructure, medicines, human resources, and training to diagnose and manage NCDs in public healthcare settings [56, 57].

There is also a lack of trust-building dialogue in between doctors and patients in public healthcare settings. The importance of doctor's attitude towards patient and the time invested in talking to the patient is discussed in earlier literature [58]. However, there is a lack of professional patient-centered attitude specifically in public healthcare system [59]. A systematic review of primary physician consultation reports the physician consultation time in India to be just around 2 min [60]. Additionally, the poor processes and management of healthcare services manifested in favoritism and bribery are building distrust on healthcare system [61]. Sensitization of the healthcare systems towards enabling a positive patient experience could build trust and improve utilization of public healthcare facilities [62].

Healthcare system's inadequacies were more profound during COVID-19 thereby derailing the trust in public healthcare system in Bihar. In concurrence with our study's findings, evidence point that the COVID-19 exposed the health system inadequacies, and exacerbated the challenges faced in accessing healthcare for

COVID-19 and non-COVID patients including those with long-term illness, pregnant women, and those requiring emergency healthcare services [63–65].

Notwithstanding the above, we found that the seeking treatment for self/family member, and health worker visits in the last one year was associated with trust on public healthcare system. Individuals who reported seeking treatment, and those who reported a health worker visit had a lower level of distrust on public healthcare system. Signifying that interactions with the public healthcare system, and healthcare providers improves trust. Earlier studies concord with these findings [66, 67].

Our research is among the few studies that systematically analyzed trust in public healthcare system in Bihar, India. Use of a standardized scale to measure trust, and mixed-methods nature of the study are major strengths of our work. However, a smaller sample size of the quantitative phase ($n=360$) could be a potential limitation. Also, the study explored only patient perspectives on factors influencing trust in public healthcare system. Future studies with a higher sample size, and exploring the perspectives of providers and other key stakeholders involved in healthcare delivery are required to further understand the trust on public healthcare system.

Conclusions

Three fourth of the participants had a low level of trust in public healthcare system. Those belonging to poorest regions, suffering from non-communicable diseases (NCDs) and those who faced challenges in accessing health care had the lowest trust. Health systems should be strengthened in terms of availability of manpower, infrastructure and medicines and technologies. In addition to infrastructural improvements, the healthcare delivery processes should be strengthened through better provider-patient interaction, timeliness and quality of services. Professionalism in delivery of healthcare services in the public healthcare system is to be installed through training of healthcare workers, strengthening the patient feedback mechanisms and ensuring quality control. Community education and awareness about available services through frequent health worker interactions could improve trust on public healthcare system.

Supplementary Information

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Supplementary Material 1.
Supplementary Material 2.
Supplementary Material 3.

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Not applicable

Authors' contributions

AK, PBK, and KRT developed the study proposal. AK translated the tools, conducted the data collection, entry, and cleaning. AK and PBK undertook the formal analysis and writing. PBK & EP developed the initial draft of the manuscript. KRT provided technical guidance and reviewed the manuscript. AK & EP developed Tables 1, 2, 3, and Figs. 1, and 2. All Authors read and approved the final manuscript.

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved by the Institutional Human Ethics Committee of the Central University of Kerala (IHEC Reference no: IHEC/CUK/2022/08). Informed consent to participate was obtained from all the participants prior to the survey and in-depth interviews. The research was conducted inline with the principles of Declaration of Helsinki, and ICMR guidelines for biomedical and health research involving human participants.

Competing interests

The authors declare no competing interests.

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