ACHSM Asia-Pacific Journal of Health Management

RESEARCH ARTICLE

PERFORMANCE OF PRIMARY HEALTH CENTRES, PROVIDER'S PERSPECTIVE OF WELLBEING, AND PATIENT'S ASSESSMENT OF THE CENTRES USING A NEW TOOL IN BANGALORE, INDIA: AN EMPIRICAL STUDY

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ABSTRACT

BACKGROUND:

Primary Health Centres (PHC) in India have evolved over the last seven decades to meet the healthcare needs of communities aligned to the epidemiological transitions the country has undergone. It is a well understood fact that the performance of PHCs is vital for overall improvement in the general health of the population of any nation. The relationship between the performance of PHCs, patients' perspectives of PHC performance and provider perspective of well-being is not well understood. This research aimed to test a new tool for patients' assessment of PHC performance and to explore the relationships between the centre's performance and the provider's well-being across centres with different workloads.

METHODOLOGY:

PHC workload was assessed based on the number of babies delivered to the population covered by the facility. Three PHCs with high, medium and low workloads were selected for the study in Bengaluru (Bangalore), Karnataka, India. The centres were assessed based on the Indian Public Health Standards. A new tool 'Questionnaire for Patient's Perspective on Performance of Primary Health Centres' (Q4PHC) was developed and tested for reliability. A total of 298 patients assessed the performance of these PHCs using Q4PHC by an 'exit survey'. 36 Provider's perspective on one's well-being were studied using the Quality of Life (WHO QoL Bref) tool and the work engagement tool (The Utrecht Work Engagement Survey - UWES). The data were analysed across the three centres using the ANOVA test.

RESULTS:

Q4PHC was found to be reliable with have high internal consistency. Patients assessed the 'low' workload PHC as the best-performing among the three centres ($p<0.000$). Provider's well-being was found better in 'medium' workload PHC but was not statistically significant.

CONCLUSION:

Q4PHC is found to be a useful instrument to assess PHC performance from patients' perspective in the Indian context. The study results suggest that there is a trade-off between the provider's perspective on well-being and maximum PHC performance.

KEYWORDS

primary health centres, performance assessment, healthcare provider's perspective, patient's perspective, multi-approach.

INTRODUCTION

Life expectancy in India has been enhanced and one of the reasons for this is a reduction in communicable diseases and better reproductive and child health care. This was achieved by providing extensive preventive and promotive healthcare services and some curative services at dedicated public centres called Primary Health Centres (PHCs) that have evolved to provide care as per the epidemiological transition over time. The use of primary healthcare was universally accepted following the declaration of Alma-Ata and the PHCs deliver care in the communities. [1, 2]. Hence the performance of PHCs is vital for overall improvement in the general health of the population, specifically in a developing country like India [3]. With a fast-growing economy and more than a third of the world's population, disparities in the health of the population in India vary from state to state, from rural to urban areas and also within the same urban settings [4, 5]. In this scenario, PHC performance grows in importance, greatly contributing to the health of the masses. Optimising PHC performance, therefore, is the key to the success for this health care.

Research into the performance of public healthcare is usually based on the number of services delivered with an emphasis on care effectiveness, access, equity, and efficiency [6-8]. The Primary Health Care Performance Initiative Framework for the assessment of primary healthcare consisted of health financing, drugs and supplies, available infrastructure and workforce, accessibility and availability of effective primary healthcare services, quality of primary care, effective services coverage, health status and equity [9]. Traditionally in India, the performance of PHC has been assessed based on output and outcome indicators, such as the number of patients served, maternal mortality rate, infant mortality rate, cost of care, etc., with minimal emphasis on patient satisfaction, cost-effectiveness and fund utilisation [10]. While there has been some emphasis on the performance of the primary health system, there is a general lack of knowledge on what works in a primary health setting, including inputs from various stakeholders, which is based on the principles of co-design that could be the way forward [9, 11].

Researchers believe that there is a need for agreement on the indicators that fit the purpose as only a few validated primary care performance measurement instruments exist, but they are not validated for PHCs in low and middle income countries [12]. There is also a need for knowledge on the effects of various components of performance in these countries [6].

The performance of a PHC itself has been assessed from the perspectives of the centre and of the providers [3]. Provider performance is generally assessed based on the number of cases treated or other output indicators, but no single standard measure exists [13]. Provider performance could be tested with well-being tools, such as the Work Engagement Scale [14, 15]. Kahn defined employee engagement or rather work engagement as 'the harnessing of organisation members' selves to their work roles; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances" [16]. This concept has further evolved to a positive, fulfilling and work-related state of mind that is characterised by vigour, dedication and absorption [17]. Thus, engagement means being psychologically as well as physically present when working and refers to work-related well-being. The quality of life is an indicator of the functional dimension in all life spheres of a person and is an essential outcome of the interactions of oneself and their environment [3, 18-19].

The utilization of the PHC depends on the perceived performance of these centres by patients [21, 22, 23]. A tool to measure patient satisfaction, the 'Patient Satisfaction Questionnaire – Short Form 18' has been established and long been used [24], however a tool to measure PHC performance from a patient's perspective in an Indian setting is not available. There is a need for developing such a tool so as to aid in accurate assessment and to enable enhanced utilization by the patients.

Further, the performance of PHC has been studied from various perspectives individually but never from multiple perspectives. We identified that PHC performance should be captured as a whole, and the inter-relationships explored from multiple perspectives of the centre, the providers, and the patients. Thus, this study was designed not only with the objective of developing a reliable questionnaire to capture the patient's assessment of the PHC, but also to explore providers wellbeing (work engagement and quality of life) and explore how these relates to the input-output of the centres.

The research questions addressed in this study are:

1. What is the performance of a PHC in terms of infrastructure availability and services delivered?
2. What measures are used by the patients to assess a PHC? Are these reliable in the Indian context?
3. What is the patient's perspective on the performance of each PHC?
4. What is the performance of the providers defined by their wellbeing assessed by the quality of life and work engagement at each PHC?
5. Can we distinguish patterns among the centre, provider's wellbeing, and patients' perspectives of performance across different PHCs?

METHODOLOGY

STUDY DESIGN

A descriptive cross-sectional quantitative research methodology was employed in three PHCs to capture the performance at centre level, to assess the Quality of Life and Work Engagement of the providers and to assess the patients' perspective on performance, for which a new questionnaire was developed.

The data was collected in multiple phases by the first author from various perspectives (centres, providers, and patients) between September 2017 and July 2019. The quantitative data was analysed with statistical tests.

ETHICS APPROVAL

The study was approved by the Manipal University Ethics Committee, Manipal University, Manipal, Karnataka. Ethics in research procedures were followed in the study by obtaining written informed consent from the participants with assurance of confidentiality.

PHC SAMPLE

The research was conducted in three PHCs located in the urban district of Bengaluru, India. The Bengaluru urban district is administratively divided into four talukas or blocks, and there are 20 PHCs that operate 24 hours a day, seven days per week. The number of pregnant women who delivered babies at these centres is related to the number of patients utilising the services and their perceived quality of care at the PHC reflecting the general performance of the PHC concerned [25]. The number of deliveries conducted at PHCs is also a major output indicator [25], hence the PHCs were selected based on the number of pregnant women who delivered babies in the centre in relation to the population served (delivery load) in the financial year 2016-2017. The PHCs were arranged in the order of delivery load (number of births to the population served) that was considered as the performance; the PHCs with the highest, medium, and least maternal delivery load were included in the study. The well-performing PHC-1 had five subcentres, while both the medium PHC-2 and the low-performing PHC-3 had four subcentres, all providing primary care in the community. The PHCs were included in the study to explore the relation between the performance of PHCs from the provider's well-being and the patient's perspective.

PROVIDER SAMPLE

On visiting the PHC, all the healthcare providers (doctors, staff nurses, laboratory technicians, pharmacists, optometrists, and health assistants) at these centers were requested to participate in the study to record their quality of life and their work engagement. All the providers participated in the study by offering their consent and the details of the personnel included are in Table 1.

TABLE 1. DETAILS OF PHC FACILITY PROVIDERS WHO PARTICIPATED IN THE STUDY

Personnel	High Number Deliveries PHC-1		Medium Number Deliveries PHC-2		Low Number Deliveries PHC-3		Gender Total		Total
	Male	Female	Male	Female	Male	Female	Male	Female	
Doctors	1	0	0	1	1	1	2	2	4
Staff Nurses	0	4	0	3	0	4	0	11	11
Pharmacists	1	0	0	1	0	1	1	2	3
Laboratory technicians	0	0	0	1	0	1	0	2	2
Optometrists	1	0	1	0	0		2	0	2
Health Assistants	0	4	2	4	0	4	2	12	14
Total	**3**	**8**	**3**	**10**	**1**	**11**	**7**	**29**	**36**
Mean Age (SD)	47.3 (9.5)		40.2 (9.8)		39.0 (10.0)				41.94 (10.2)
Population covered	56,081		48,037		54,513				158,631

PATIENT SAMPLE

All the patients attending a PHC were approached after their consultation by a doctor, nurse, or healthcare worker to participate in an exit survey, with the aim of including 100 willing patients who had received care at each PHC. For patients under 18, their parents were asked to participate or if the patients wanted their guardians to participate on their behalf, they were included in the study.

PERFORMANCE MEASUREMENTS

AT THE LEVEL OF THE CENTRES

PHC service delivery data was captured and maintained by the Health Management Information System. Retrospective secondary data for the year 2016-2017 was utilised. The following service delivery data were collected from the Health Management Information System:

1. The number of patients treated on an outpatient basis
2. The number of patients in the middle of the night was considered equal to the number of in-patients
3. The number of pregnant women who received three pre-natal check-ups
4. The number of children older than 16 months who received the measles vaccine (full immunisation)
5. The number of women who delivered babies in the PHC

The availability of infrastructure and services was assessed based on the Indian Public Health Standards checklist on the first day of the visit to the PHC [25, 26]. This tool had 216 items that can be assessed. In order to attain a numerical value to aid in the comparison, these items were scored as: 0 – not available; 1 – available but not functioning; 2 – available but partly functioning; and 3 – available and fully functioning. Negative items like 'Is there a garbage dump close to PHC', 'Is there any incidence of any sexual advances., oral or physical abuse, sexual harassment by the doctors or any other paramedical?' were reverse scored to attach more numbers to the absence of the event and increase the total score. The maximum score a PHC could obtain was 648 and the minimum was 0.

AT THE LEVEL OF THE PROVIDERS

The World Health Organization Quality of life Bref (WHO QoL BREF): The WHO developed a short version of the questionnaire (original with 100 questions), which consisted of four domains with 26 items: D1-Physical Health (7 questions); D2-Psychological (6 questions); D3-Social Relationships (3 questions); D4-Environment (8 questions), along with general questions on the quality of life (Q1) and general health (Q2) [27-29]. The questions were scored on a Likert scale of 1 (not at all) to 5 (extreme/completely). Some examples of questions were: How much do you enjoy your life? How often do you have negative feelings, such as blue mood, despair, anxiety, and depression? The questionnaire was applied in English as well as the local language to aid in better interpretation and understanding of the questionnaire by the participants. These translated tools were verified by an expert in both languages to ensure the quality of the translation.

The Utrecht Work Engagement Survey (UWES): Utrecht Work Engagement Survey tool (UWES) was used to capture health professional engagement, which is a positive job outcome [30]. The UWES questionnaire has been validated for the Indian setting and applied in research [31, 32]. The instrument contained 17 items and was applied in English as well as the local language to aid in better interpretation and understanding of the questionnaire by the participants [30]. The items were scored on a Likert scale from 0 (never) to 6 (always or every day). The items covered three dimensions of engagement: vigour (6 items), dedication (5 items) and absorption (6 items). An example of an item in the absorption subscale was 'Time flies when I'm working'.

AT THE LEVEL OF THE PATIENTS

The patient's assessment of the PHC was performed using the newly developed 'Questionnaire for Patient's Perspective on Performance of Primary Healthcare Centres' (Q4PHC). The details of the development, testing for the validity and reliability of the tool are as follows.

- In-depth interviews were conducted with 188 patients at the selected PHCs to develop insights from the patient's perspectives on PHC performance. Interviews with the consenting patients were conducted in the local language to aid in communication. The recorded interviews were translated into English by professionals, transcribed and analysed thematically [33] using ATLAS-TI software to develop themes for PHC performance assessment by the patients.

- The analysis of these interviews resulted in the following themes: the behaviour and attitude of providers; availability of 24/7 diverse services; availability of diagnostic services; diagnosis and treatment for emergencies; availability of medicines; cost of care and medicines; effectiveness of treatment; PHC infrastructure; organisation of services for better functioning of the PHC. For each of these nine themes, items were formulated, which resulted in 53 initial items.
- The tool consisting of nine dimensions and 53 initial items is presented in Appendix 1. The items were finalised based on a discussion with the authors. The items were formulated as statements to be scored on a Likert scale of 1 (totally disagree) to 5 (totally agreed).

- Validity was tested using Principal Component Analysis and Factor Analysis which showed considerable overlap at the item level and did not contradict the theoretical scales [34, 35]. The items loaded on 11 factors as opposed to the original nine domains, however, the loadings were inconclusive except for the domain 'cost of care and medicine'. Hence, all nine theoretical themes were retained as nine subscales.

- After initial reliability analysis of each of the nine subscales, two subscales (availability of medicines and organisation of services) and certain items were deleted. This resulted in the Q4PHC tool with seven subscales and 41 items. The Cronbach's alpha for the total tool was found to be highly reliable with 0.938 (Appendix 2). The Cronbach's alpha for the subscales varied from sufficient (>.60) to high (>.80). Table 4 gives the details of the number of items and Cronbach's alpha per subscale.

The RAND short-form Patient Satisfaction Questionnaire-18 was also administered so as to triangulate patient findings in this study. This questionnaire consisted of seven domains, namely general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent with doctor, accessibility, and convenience with 18 statements (nine positive and nine negative) and was scored from 1 (strongly agree) to 5 (strongly disagree); the negative statements were reverse coded in the analysis of the tool for appropriate scoring [24].

The patient feedback form from the Urban PHC Quality Manual of the Ministry of Health and Family Welfare, Government of India was used. This tool included 10 statements addressing the behaviour and attitude of staff, the waiting time, promptness, availability of drugs, tests, and information at PHC, time spent in care, cost of care and cleanliness of PHC with scoring on the Likert scale of 1 (poor) to 5 (excellent) [36].

DATA ANALYSIS

The data were cleaned and analysed using IBM SPSS 25. The validity of the Q4PHC tool was tested using Principal Component Analysis and Factor Analysis, while the reliability was tested with Cronbach's alpha. The data from the centres, providers and patients were analysed within the PHC as means and distribution that were computed per centre. One-way ANOVA with Scheffé test was conducted to check for differences between the centres (threshold: $p < 0.05$).

RESULTS

The availability of the infrastructure and services delivered at the PHCs, the quality of life and engagement of the providers, and the PHC performance from the patient's perspective were analysed to identify patterns and understand the relations between various components.
The results of the analysis and comparison between the PHCs are presented in Tables 2, 3 and 4. The detailed results are described below.

Availability of infrastructure and services delivered at PHCs
It was observed that the PHCs did not have any significant difference in the availability of infrastructure and other sources assessed based on the Indian Public Health Standards checklist (Table 2). All the PHCs had buildings on government owned land with sufficient vacant areas around their designated boundary (compound). The availability of the infrastructure was better in PHC 1 (score 484) and PHC 2 (score 479) in comparison with PHC 3 (score 433). Even though PHC 2 served less people, the PHCs showed no significant difference in total population: PHC 1 (56,081), PHC 2 (48,037) and PHC 3 (54,513). On examining the availability of infrastructure and other resources, PHC 1 performed best, followed by PHC 2 and PHC 3.

The number of deliveries conducted, the number of outpatients treated, the number of inpatients, and the number of women who received three antenatal check-ups were all highest in PHC 1, followed by PHC 2 and PHC 3. The number of children who received full immunisation was highest in PHC 1, followed by PHC 3 and PHC 2. On the whole, PHC 1 performed best in the number of services delivered.

PERFORMANCE OF PHCS IN RELATION TO PROVIDER WELL-BEING

Provider well-being represented as the quality of life and work engagement was analysed in the PHCs individually (Table 3). Provider quality of life did not show any significant difference between the PHCs, however, PHC 3 scored higher than PHC 2, and PHC 2 scored higher than PHC 1. On examining the work engagement of providers, PHC 2 was significantly better than PHC 1 ($p<0.030$), nevertheless, there was no significant difference between PHC 1 and PHC 3.

PATIENT ASSESSMENT OF PHC PERFORMANCE

A comparison of PHCs using the total score from Q4PHC (Table 4) found that PHC 3 performed best, followed by PHC 1 and PHC 2 ($p<0.000$). Patient PHC assessment based on the total score of short-form patient satisfaction questionnaire-18 showed that PHC 3 was performing the best, followed by PHC 1 and PHC 2 ($p<0.000$). The patient's assessment based on the patient feedback form from the Urban PHC quality manual showed that PHC 3 performed best, followed by PHC 1 and PHC 2 ($p<0.000$).

TABLE 2. ANALYSIS OF INFRASTRUCTURE AND SERVICES PROVIDED AT THE PHCS

Component	Source	Variable (Measure)	Statistics	1 High Number Deliveries PHC	2 Medium Number Deliveries PHC	3 Low Number Deliveries PHC	Difference**
Population served	Indian Public Health Standards tool survey		Number	56,081	48,037	54,513	1>3>2 (1,3,2)
Infrastructure	Indian Public Health Standards tool survey*		Total Score	484	479	433	1>2>3, 1~2 (1,2,3)
Service delivered	Health Management Information System (2016-17)	Women who delivered babies in PHC	Number	399	133	22	1>2>3 (1,2,3)
		Out-Patients treated		16474	15114	10457	1>2>3, 1~2 (1,2,3)
		In-Patient Head Count at midnight		792	240	44	1>2>3 (1,2,3)
		Women who received 3 ANC check-ups		681	190	0	1>2>3 (1,2,3)
		Fully Immunized children		332	169	322	1>3>2, 1~3 (1,3,2)

*PHC (216 items with the maximum score of 648); **1- High Deliveries PHC, 2- Medium Deliveries PHC, 3- Low Deliveries PHC

TABLE 3. ANALYSIS OF PROVIDER DATA

Group	Source	Variable (Measure)	Statistics	1 High Number Deliveries PHC	2 Medium Number Deliveries PHC	3 Low Number Deliveries PHC	Scheffé test**
Provider	Employee survey	Quality of Life (QoL Bref)	N	11	13	12	No significant difference but trend in 3>2>1 seen (3,2,1)
			Mean	13.7053	14.6053	14.9648	
			F	2.515			
			Sig.	0.096			
		Work Engagement (UWES)	N	11	13	12	2>1, 1~3
			Mean	4.5936	5.2443	4.8971	
			F	3.923			
			Sig.	0.030			

**1- High Deliveries PHC, 2- Medium Deliveries PHC, 3- Low Deliveries PHC

TABLE 4. ANALYSIS OF PATIENT DATA

Tool	Variable (Measure)	Number of Items	Cronbach's alpha	Statistics	1 High Number Deliveries PHC	2 Medium Number Deliveries PHC	3 Low Number Deliveries PHC	Scheffé test**
				N	**101**	**97**	**100**	
Q4PHC	*Behaviour and attitude*	13	0.941	Mean	4.1464	3.9055	4.4180	3>2, 3>1 (3,2/1)
				F	13.372			
				Sig.	.000			
	Availability of Specialist care	4	0.652	Mean	2.7343	2.3686	3.4767	3>1>2 (3,1,2)
				F	37.338			
				Sig.	.000			
	Availability of diagnostic services	5	0.876	Mean	2.8779	2.3090	3.8300	3>1>2 (3,1,2)
				F	24.610			
				Sig.	.000			
	Availability of Emergency care	5	0.727	Mean	3.3772	3.1198	3.5940	3>2, 1=3 (3/1,2)
				F	6.945			
				Sig.	.001			
	Cost of Treatment	4	0.865	Mean	4.3045	4.2191	4.8200	3>1, 3>2, 1=2(2,1/2)
				F	23.228			
				Sig.	.000			
	Effectiveness of Treatment	5	0.725	Mean	3.2084	3.1828	3.3715	3>1, 3>2, 1=2 (3,1/2)
				F	11.939			
				Sig.	.000			
	Adequate Infrastructure of PHC	5	0.875	Mean	4.2320	3.3077	3.7115	1>3>2 (1,3,2)
				F	26.116			
				Sig.	.000			
	Total Q4PHC	**41**	**0.938**	**Mean**	**3.5522**	**3.2022**	**3.9431**	**3>1>2 (3,1,2)**
				F	**32.123**			
				Sig.	**.000**			
Short form Patients satisfaction	General Satisfaction	2	.331	Mean	4.1832	4.1563	4.4350	3>1>2 (3,1,2)
				F	4.356			
				Sig.	.014			
		4	.608	Mean	4.2921	3.9897	4.3175	

questionnaire - 18	Technical Quality			F	8.528			1>2, 3>2, 1=3 (1/3,2)
				Sig.	.000			
	Interpersonal Manner	2	.688	Mean	4.3713	3.8041	4.5150	1>2, 3>2, 1=3 (1/3,2)
				F	19.442			
				Sig.	.000			
	Communication	2	.636	Mean	4.3366	3.8299	4.4900	3>1, 3>2, 1=3 (1/3,2)
				F	15.322			
				Sig.	.000			
	Financial Aspects	2	.662	Mean	4.3416	4.3247	4.7350	3>1, 3>2, 1=2 (3,2/1)
				F	15.048			
				Sig.	.000			
	Time spent with doctor	2	.427	Mean	3.8564	3.4485	4.4200	3>1, 3>2, 1>2 (3,1,2)
				F	28.184			
				Sig.	.000			
	Accessibility and Convenience	4	.507	Mean	3.7500	3.4107	3.9367	3>2, 1>2, 1=3 (3,1,2)
				F	11.493			
				Sig.	.000			
	Total Score for Patient Satisfaction	**18**	**0.840**	**Mean**	**4.1329**	**3.8181**	**4.3450**	**3>1, 3>2, 1>2 (3,1,2)**
				F	**26.487**			
				Sig.	**.000**			
Patient feedback form	**Patient feedback form for Urban PHC**	**10**	**0.869**	**Mean**	**3.9777**	**3.6450**	**4.3340**	**3>1>2 (3,1,2)**
				F	**26.317**			
				Sig.	**.000**			

**1- High Deliveries PHC, 2- Medium Deliveries PHC, 3- Low Deliveries PHC

DISCUSSION

Three PHCs in Bengaluru, India was selected based on the number of deliveries conducted at the centres, these were compared to explore patterns among the availability of the infrastructure and services delivered, provider's quality of life and work engagement, and PHC performance from the patients' perspectives. A new tool 'Q4PHC' was developed for capturing the patient's perspective on PHC performance, this was valid and reliable. The main results showed that all centres had similar infrastructure and other resources availability. However, the centre that delivered most women scored moderate on providers scores and moderate to low according to patient's assessment. The PHC that was delivering the medium number of deliveries had better provider wellbeing scores with moderate patient assessment of performance. The centre with the lowest number of deliveries had higher patient scores and moderate provider scores. PHCs did not perform high in all the three aspects of assessment. So, centres either performed much work at the cost of moderate provider wellbeing and low/ moderate performance according to patients (PHC 1) or had high provider wellbeing scores at the cost of a moderate amount of work and moderate performance according to patients (PHC 2) or had high-performance ratings according to patients at the cost of a low amount of work and only moderate provider wellbeing (PHC 3).

PHC PERFORMANCE AS AVAILABILITY OF INFRASTRUCTURE AND SERVICE DELIVERY

In the literature, both availability of infrastructure and quantity of service delivery have been consistently considered as indicators of PHC performance [9, 10, 37, 38]. As PHCs in this study were sampled on the basis of varying numbers of women who delivered babies in the centres, it is also evident that they varied similarly in the availability of infrastructure and showed significantly different service delivery. That is, the number of deliveries still remains a good indicator of centre performance. However, this study clearly showed that this was not related to the other performance indicators, which will be discussed below.

PHC PERFORMANCE AND PROVIDER WELL-BEING

The results showed that the centres with high service delivery did not correspond with better quality of life and employee engagement. Provider quality of life (significant) and work engagement (insignificant) were better in the centre that delivered less in comparison with the other PHCs probably because they had less stress from the workload and were able to provide the needed attention to patients. The positive association between quality of life, work engagement, workload, and patient satisfaction has long been established [39]. The improved time and attention for patients not only would improve patients' perception of the centre but also provider satisfaction, which was depicted in the patients' assessment of PHC performance.

The literature has shown that provider performance and provider well-being are related, that is, providers with low engagement are less productive [14]. There is no established method of assessing provider performance at the PHC level other than the quantity of care delivered, or quality of care measured as patient satisfaction [3, 9, 10, 13]. However, our results showed that higher performance in terms of increased patient service at PHCs may be associated with the providers being low on the quality of life and work engagement. This association, which has been established in the literature, seemed to be confirmed by our study. This might be explained by reverse causality: the workload might have been so high that engagement was hampered [40].

PHC PERFORMANCE FROM THE PATIENT'S PERSPECTIVE

PHC performance has been evaluated in two ways: through patient satisfaction according to the WHO aspects for performance assessment, which are also being followed by other researchers, and by a new reliable tool to assess the performance of PHCs from the patient's perspective that was developed based on the interviews [10, 41, 42]. The aim of the latter was to encompass the experiences of people, which would be appropriate to the local context of the current study. The significance of the new Q4PHC tool, which had high internal reliability, is that it was developed based on the assessment criteria of the patients utilising the services of the PHC. Thus, the assessment of PHC using Q4PHC is more realistic in the local context than the patient satisfaction assessed using the short-form patient satisfaction questionnaire or the patient feedback form from the quality manual. As the number of items is higher, it would aid as a compass for addressing various local concerns of patients, aiding in further PHC improvement, if attempted.

A HOLISTIC MODEL FOR PHC PERFORMANCE

PHC performance assessment is a complex phenomenon since PHC functioning involves multiple stakeholders of different calibre. An apt representation of reality is possible

only when performance is represented from various perspectives reflecting the local context. It is essential to include various perspectives to get a realistic representation of the PHC functioning [43]. A combined measurement of the availability of infrastructure, service delivery, provider well-being and patient perception of PHC performance would not only enable better assessment but also provide better information for enhancing performance. Further, sharing this integral information with the patient community should be encouraged as educating them on its interpretation would enable patients to make better choices, thereby enhancing the accountability from providers and in turn better service delivery [44]. Finally, developing countries encounter resource and data constraints, so a blend of various sources (both registered/ secondary data and questionnaire/ primary data) will increase the validity of performance assessment [45]. The study results seem to depict a trade-off between working hard on the one hand and having providers who have enough time and energy for good communication with patients on the other hand.

Work engagement in primary healthcare settings is very important to unlock their true potential [46]. Engagement is positively related to patient care quality and safety outcomes, and thus patients' assessments of the service provision [47, 48, 49, 50]. Various studies have shown that the relationship between workload and work engagement could be positive or negative depending on the country, resource availability and professionals being studied [51, 52]. This inter-relationship should be studied in a greater number of PHCs so that a norm can be established. Periodic PHC performance assessment can be undertaken for regular monitoring of the PHC functioning. Performance analysis and timely reporting using data that can impact performance improvement should be considered [53].

METHODOLOGICAL CONSIDERATION

Assessing performance by the availability of infrastructure and services along with both the provider and the patients provides a multimodal approach that would result in a complete PHC assessment. However, the inclusion of only three PHCs out of the available 20 in the urban setting could be considered as a small sample. For the results to be more general in their application to urban and rural settings and to other low and middle income countries, further large-scale research replicating the study is recommended.

The Q4PHC developed from in-depth interviews with patients provided a strong theoretical base to assess performance as envisaged by patients themselves, thereby making it highly applicable to the setting. As not all items were loaded on all factors, further research on factor validation is needed.

CONCLUSION

The study showed that the PHC performance assessment from multiple perspectives offers a realistic view of the centre encompassing the local context. The new tool Q4PHC was valid in measuring patient perspective of PHC performance in an Indian context. The seven scales not only provide an opportunity to assess but also could direct further improvement in PHC service delivery. The providers demonstrated better wellbeing with moderate amounts of work. The centres with lower workload were scored better by the patients. The PHC performance assessment from multiple perspectives suggests there is a trade-off between providers wellbeing and the increased performance from patient's perspective; that is them working hard on the one hand and providers having enough time and energy for good interaction with patients on the other hand. Further research is needed to study and establish the interrelationship of various components; also, the allocation of weightage for various perspectives in PHC performance assessment should be explored.

DECLARATIONS

Ethics approval and Consent to Participate

The study was conducted after obtaining approval (MUEC/017/2017) from the Ethics Review Committee of Manipal University, Manipal, Karnataka, India, also, written informed consent was obtained from the study participants before conducting the interview.

CONSENT FOR PUBLICATION

All the study respondents consented to the publication of the results.

AVAILABILITY OF DATA AND MATERIALS

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

COMPETING INTERESTS

The Author RBS, Author AdR, Author AK, Author UM and Author OvS declare that they have no conflict of interest.

FUNDING

This research was funded by NUFFIC (Dutch Organization for Internationalization of Education) grant CF11830. NUFFIC had no role in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript.

AUTHORS' CONTRIBUTIONS

RBS did the literature review, tool development, data collection, data analysis, and interpretation and wrote the draft. AdR contributed to the research design, research questions, data analysis and interpretation and to writing the draft. AK discussed the research design and writing the draft. UM contributed to data interpretation and writing of the draft. OvS contributed to the research questions, data interpretation and to the writing of the draft. All authors read and approved the final manuscript.

ACKNOWLEDGEMENTS

The authors thank the patients and the healthcare providers who responded to the study and provided insight that contributed to the culmination of this research.

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APPENDIX 1

QUESTIONNAIRE FOR THE PATIENT'S PERSPECTIVE ON PERFORMANCE OF PHC (Q4PHC)

Scoring pattern: 1-Totally disagree; 2-Disagree; 3-Do not disagree or agree; 4-Agree; 5-Totally agree

Behaviour and Attitude of staff						
Sl No	**Details**	**1**	**2**	**3**	**4**	**5**
1	I/patient feel welcomed in this Primary Healthcare Centre (PHC)					
2	My doctor treats me/patient with respect					
3	My doctor explains me/patient about the disease/illness					
4	My doctor raises his voice when I have/patient has doubts about medication/ illness [R]					
5	My doctor shows sincere interest in solving my/patient's problems					
6	My doctor and nurse tell me/patient exactly when services are provided					
7	My doctor and nurse are always willing to help me/patients					
8	My doctor is busy to respond to my/patient's requests [R]*					
9	My doctor spends adequate time in treating me/ patient					
10	The staff are neat in appearance					
11	The staff are empathetic to me/patient during the visits					
12	I am happy that I/patient came to this hospital for treatment					
13	My/patient's expectations from this hospital were fulfilled					
14	I/patient will recommend this hospital to my friends and relatives					

Availability of diverse and rich care by doctor round the clock and specialists						
Sl No	**Details**	**1**	**2**	**3**	**4**	**5**
15	All my/ patient's health problems are addressed here					
16	I/patient can get my eye check-up done in this hospital*					
17	I/we can get my/ patient's spectacles in this hospital*					
18	There is need for an additional lady doctor in this hospital [R]					
19	There is need for an additional male doctor in this hospital [R]					
20	I am /patient is happy to get specialist care from a private setup [R]					

Availability of diagnostic services						
Sl No	**Details**	**1**	**2**	**3**	**4**	**5**
21	Blood tests are always available in this hospital					
22	I am/patient is paying for the blood tests in this hospital [R]					
23	I am/ patient is happy to have an ECG facility in a private hospital [R]					
24	I am/ patient is happy to get x-ray facility in private hospital [R]					
25	I am/patient is happy to get scanning facility in private hospital [R]					

Diagnosis and treatment for emergencies						
Sl No	**Details**	**1**	**2**	**3**	**4**	**5**
26	I/patient get emergency services like care during accidental and heart attack					
27	I am/patient is happy to get emergency services like care during accidental and heart attack in private hospital [R]					
28	I/patient prefer to come to this hospital for dog bite					
29	I/patient prefer to come to this hospital for snake bite					

30	I/patient prefer to go to private facility in case of emergency like accident/ heart attack [R]					

Availability of medicines						
Sl No	**Details**	**1**	**2**	**3**	**4**	**5**
31	The medicines that the doctor prescribes are available in this facility only*					
32	The doctor prescribes some medicines to be bought outside [R]*					

Cost of care and medicines						
Sl No	**Details**	**1**	**2**	**3**	**4**	**5**
33	I/patient have to pay for some services here [R]					
34	I/patient have to pay for doctor's consultation here [R]					
35	I/patient have to pay for medicines here [R]					
36	I/patient have to pay for baby delivery services here [R]*					
37	I/patient have to pay for blood tests here [R]					

Effectiveness of treatment						
Sl No	**Details**	**1**	**2**	**3**	**4**	**5**
38	My/patient's illness is cured in this government hospital most of the time					
39	Most of the time I/patient go to private set up for care as treatment is better there [R]					
40	I/patient go to private set up for care as treatment is not available here [R]					
41	When costs are ignored, recovery is quicker in private setup [R]					
42	Most of the time treatment is better in a government hospital					
43	Someone (sister/brother) from the PHC visits me at home*					

Infrastructure of PHC						
Sl No	**Details**	**1**	**2**	**3**	**4**	**5**
44	This hospital has adequate number of beds					
45	The physical facilities at PHC are visually appealing (building is aesthetic with good roof, wall and flooring)					
46	There is need for more furniture in this hospital [R]*					
47	The hospital should be cleaner than it is at present [R]*					
48	There is adequate drinking water facility					
49	The delivery room is comfortable and clean					
50	The PHC building should be extended as there are more patients [R]*					
51	The toilet facility (with water) in this hospital is adequate					

Organization of services for better functioning of PHC						
Sl No	**Details**	**1**	**2**	**3**	**4**	**5**
52	I/patient was received by nurse/other hospital staff as soon as I/patient came*					
53	The delivery facility is well organized in this PHC*					

[R]Reverse coded (23 items)

*Deleted from final analysis of the PHCs

APPENDIX 2

Reliability scores of various tools and its subscales

Sl No	Tool	Subscale	Cronbach's Alpha	Items to be deleted for Alpha to increase	Alpha after deleting affecting items
1	QolBref*	Physical Health	0.443		
		Psychological	0.531		
		Social relationships	0.573		
		Environment	0.543		
2	UWES*	Vigor	0.558		
		Dedication	0.558		
		Absorption	0.450		
3	Patient satisfaction questionnaire from UPHC		0.869$		
4	RAND	General Satisfaction	0.331		
		Technical Quality	0.608#		
		Interpersonal Manner	0.688#		
		Communication	0.636#		
		Financial Aspects	0.662#		
		Time spent with doctor	0.427		
		Accessibility and Convenience	0.507		
		Total RAND	0.840$		
5	Q4PHC	Behaviour and Attitude of Staff	0.906	8:0.941$	
		Availability of rich and diverse care round the clock	0.389	16: 0.486 17: 0.480	0.652#
		Availability of Diagnostic services	0.876#		
		Diagnosis and treatment for emergencies	0.727#		
		Availability of medicines	-0.362	31, 32	
		Cost of care and medicines	0.847	36: 0.865	0.865$
		Effectiveness of treatment	0.625	43: 0.725	0.725#
		Infrastructure of PHC	0.690	46: 0.761 47: 0.720 50: 0.697	0.875$
		Organization of services	0.577	52, 53	
		Total Q4PHC	0.938$		

Items deleted from Q4PHC after Cronbach's alpha for ANOVA analysis: 8, 16, 17, 31, 32, (31 and 32 are all items in the dimension availability of medicine) 36, 43, 46, 47, 50, 52, 53 (52 and 53 are all items in the dimension organization of services)

*Small sample size of 39; # Sufficient; $ High