Barriers to Accessing Health Services and their association with treatment adherence in tuberculosis patients at a hospital in Peru

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ABSTRACT

Background: Tuberculosis affects vulnerable populations and has become a challenge for the health system. There are difficulties accessing services which create serious consequences for treatment success.

Aim: To establish the relationship between the determinants of access to health services and treatment adherence in patients with tuberculosis.

Methods: Correlational research with an observational cross-sectional design, in 120 patients with tuberculosis from January to July, 2019. We used the modified *Tanahashi* model to measure the determinants of access to health services, vand the Morisky-Green test, for treatment adherence. For the analysis, the Spearman's correlation coefficient was used with its corresponding p-value for statistical significance.

Results: A total of37.5%werenon-adherent patients and we identified a statistically significant relationship between the availability, accessibility, acceptability, contact and adherence dimensions in the bivariate analysis (Spearman's Rho: 0.694; p=0.000; Spearman's Rho: 0.744; p=0.000; Spearman's Rho: 0.607; p=0.000; Spearman's Rho: 0.693; p=0.000 respectively).

Conclusions: The existence of multidimensional dynamics of treatment adherence was evidenced, which suggests the need to design and implement health policies to reduce or eliminate healthcare barriers among TB patients to achieve treatment adherence and ensure equitable and efficient access to health services.

Keywords: Health services accessibility, Tuberculosis, Treatment Adherence and Compliance

INTRODUCTION

Tuberculosis is a disease that mainly affects vulnerable populations and is a challenge for the health system. Although there has been an increase in efforts to control it, which has brought significant advances, there are barriers that contribute to current high morbidity and mortality rates[1-3]. This general picture is associated with poverty and poor living conditions, which in addition to the difficulties in availability, acceptability, accessibility and control to reach health services, brings serious consequences for treatment success and an increase in health deterioration[4-7].

Carbajal et al[8] and Plata[9], state that the main consequence associated with this problem are non-compliance with treatment that increases contagiousness in contacts, loss to therapeutic follow-up, relapses, complications, failures, drug resistance and deaths. According to the national technical standard for the control of tuberculosis, treatment or medication non-adherence occurs when patients skip three continuous or alternate scheduled doses during the first phase of treatment or five continuous or alternate doses throughout the whole treatment[10].

In this regard, the World Health Organization (WHO) states that a successful tuberculosis treatment requires collaborative work among the different components of the health system. In addition, the WHO highlights the need of a robust network of service providers offering universal access in terms of coverage and quality for the diagnosis and treatment of those affected by tuberculosis[11].

It is necessary to remark that accessibility, defined as the systematization of a portfolio of services, can be achieved in a timely manner by the population. From a socioeconomic and cultural point of view, health systems need to ensure that patients receive a health offer with quality-efficiency, efficacy and effectiveness- and warmth, contributing to the community's health[12-15].

The National Institute of Statistics and Informatics (Instituto Nacional de Estadística e Informática-INEI) of Peru found that only 28% of people who had some kind of discomfort were treated in a public or private health facility, in a research conducted in 2018on barriers to access to health services. Similarly, the study showed that 32 % did not go to a health facility because they did not consider it to be necessary, preferred to treat themselves with home remedies or self-medication, lack of money, remoteness, or delayed care[12].

Peru has a 30-year history of prioritizing the fight against tuberculosis, providing political and administrative support that allows prevention, early diagnosis, timely treatment and adequate follow-up of cases. That, along with adequate management, is contributing to a continuous and firm process in the control of the disease[16].However, that does not seem to be enough to stop it from being a serious public health issue, as shown by the data registered in 2017 about the treatment success in the group of new cases and relapses whose result was 86%; in previously treated cases excluding relapses 57% and in TB and HIV co-infected, 66%[17,18]. Additionally, the Ministry of Health-MINSA indicates that the low adherence to treatment was among the main causes that limit TB control by 2018 in Peru. We should add that, at national level, there was a 6.4% of loss to follow-up in drug-susceptible TB, and in regions of the country such as Callao, it was higher than 10%, and in multidrug-resistant (MDR) TB the average was around 30%[19].

Nowadays, there are available tools and resources to successfully tackle diseases; however, this progress is not available for a large number of citizens. Some of the barriers to access to health services are (i) lack of resources that impede quality supply in health facilities; (ii) poor and inequitable use of government assets; (iii) poverty or extreme poverty; (iv) lack of health insurance;(v) out-of-pocket expenses of those affected, who by assuming the costs of care, become more impoverished; (vi) situations dependent on health services, such as distance to the facility, distrust in the professionals and technicians knowledge in charge of care, waiting time for consultation, diagnostic tests, and initiation of treatment; (vii) corruption[20-23].

Arakawa et al[4] conclude that accessibility is an important element in understanding the responses regarding the health facilities'use and performance. They identified some barriers to the access to tuberculosis treatment, such as transportation costs.

Dueñes et al[24], in another study in Colombia, reported that the economic impact and dissatisfaction with timeliness of care at the health institution were factors for treatment non-compliance. Another study conducted in that country found that failure to recognize the six-month duration of the treatment was among the barriers associated with adherence to TB medication OR 3.51 95% CI 1.87-6.59; also, another barrier was occasional lack of drugs supply by health services OR 5.53 95% CI 1.20-5.52[8].

Rivera et al[2] observed that the fact of not considering the hours of service adequate OR 78.13 CI 95% 4.84-125, 97 and not receiving the laboratory results OR 46.13 CI 95% 2.85-74.77 were among the factors associated with abandoning the treatment of multi-drug resistant tuberculosisin a study in the Callao Region in Peru.

Obstacles have increased among those who obtain the offered services and those who do not receive them, and for this reason our aim is to study the dynamics of health care during the disease in depth. Hence, the objective of the research is to establish the relationship between the determinants of access to health services and treatment adherence in patients with tuberculosis.

MATERIAL AND METHOD

Study design. This research had a quantitative approach, with a descriptive-correlational scope and a cross-sectional observational design.

Population and sample: The population of interest was composed of 175 individuals, we used a probability sample of 120 tuberculosis patients who were in the second phase of the country's standard therapeutic scheme at the facilities of the Regional Health Directorate of Callao and who were treated in the outpatient clinics of the Daniel Alcides Carrión National Hospital from January to July 2019.The type of sampling used was systematic, which is a simple method of application and has a similar effect to that obtained with stratification and is more accurate than simple random sampling (25).

Data collection instrument: The modified *Tanahashi* model, used in other pathologies, was used to measure the determinants of access to health services and was adapted for tuberculosis control. It included 43 dichotomous closed-ended questions and defined access as factors that influence the health care process and are related to elements of health care delivery and patient recognition and involves or does not involve aspects of quality of care (22) and considers four dimensions: availability-9 questions- accessibility-15 questions-acceptability-7 questions- contact-12 questions-. The instrument had a reliability of 0,75 according to Kuder Richardson's KR-20 method.

Treatment adherence was measured through Morisky-Green's test that defines adherence as the way a user responsibly complies with the pharmacological or non-pharmacological therapy prescribed by a physician (26), and consists of two dimensions: compliance - two questions - and constancy - two questions), with a 0.79 reliability according to Kuder Richardson's method KR- 20.

Procedure. An exploratory analysis of the data was performed to determine frequencies and their distribution, complemented by frequency tables. To establish the correlation, the value scale was considered qualitative, therefore,the non-parametric Spearman's correlation coefficient was used with its corresponding p-value for statistical significance. For data analysis, the statistical program SPSS version 25 was used.

Ethical aspects: The study was reviewed and approved by the research ethics committee of the Daniel Alcides Carrion Hospital in the Callao region of Peru.

RESULTS

A total of54.2 % of the total participants in the study were men; taking into consideration the age range, 86.7 % were between 18 and 47 years old; 40.8 % of the cases had drug-resistant TB, this is probably explained by the fact that since the Daniel Alcides Carrión National Hospital is the most complex hospital in the Callao region, the most complicated cases arrive for attention. The research also found that 63.3% of the patients had family responsibilities since they were married or living with a partner; only 12.5% had higher education, university or technical training; all the surveyed cases had jobs, some of them permanent and others temporary, and almost 62% of them were dependent as a work modality. That fact does not reflect the reality in the population of Callao, and although it was not the reason of the study, we can deduce that those who do not work or have very low family income do not go to health facilities because of the costs they would have to assume. Sixty-four percent of the patients expressed they had a family income up to $194, which would be related to what is stated above (Table 1).

In terms of adherence to treatment, 37.5% showed non-adherence to anti-tuberculosis treatment as assessed by Morisky Green's predictive scale. It should be observed that this fact would allow us to understand why the Region of Callao has a high number of loss to follow-up, failures and deaths (Table 2).

Table 1: Sociographic characteristics of the population

Characteristics	n = 120	%
Gender		
Male	65	54,2
Female	55	45,8
Age (years)		
18 - 27	61	50,8
28 - 37	28	23,3
38 - 47	15	12,5
>48	16	13,3
>Tuberculosis TYPE		
drug-susceptible TB	71	59,2
Drug-resistant TB	49	40,8
Civil status		
Single	43	35,8
Married	36	30,0
Cohabiting with a partner	40	33,3
Divorced	1	0,8
Schooling level		
Without formal education	8	6,7
Primary	32	26,7
Secondary	65	54,2
University education	10	8,3
Technical education	5	4,2
Work modality		
Dependent	74	61,7
Independent/self-employment	46	38,3
Monthlyfamilyincome (dollars)		
Up to194	77	64,2
From195 to 408	43	35,8

Table 2: Treatment adherence according to the predictive scale of Morisky-Green per tuberculosis type

Quistiones	Patients with Tuberculosis n=120			
	Yes (1)		No (0)	
	n	%	n	%
Have you ever forgotten to go to the health facility to take the medicine?	52	43,3	68	46,7
Have you ever reduced the dose or skipped a medicament or medicaments, without the health staff noticing?	56	46,7	64	53,3
When you are feeling fine, do you ever skip going to take your medicine?	59	49,2	61	50,8
Si alguna vez se siente mal dejo de asistir a tomar la medicación?If you ever felt bad, did you avoided going to the facility to take your medicine?	56	46,7	64	53,3
Cutt-off	**n (%)**		**Category**	
Lowerthan 1	75 (62,5)		Adherent	
Higherorequalto 1	45 (37,5)		Non-adherent	

A statistically significant association (p<0.05) was found between the population's characteristics such as gender, marital status, schooling, work modality, family income and treatment adherence (Table 3).

Access barriers were evaluated using the modified *Tanahashi* modelin the context of tuberculosis. In the availability dimension, 88.9% of the non-adherent patients considered the environments not clean; only 35.6% considered that adequate equipment and materials were available for care; 73% considered that the personnel were not present;78% did not consider that there were sufficient staff to ensure their care; 62% did not receive care due to a lack of health personnel; 71% considered that the opening times were not adequate and almost 78% of patients did not receive timely care and information on the disease. The bivariate analysis identified a statistically significant relationship between the availability and adherence dimension (Spearman's Rho: 0.694; p=0.000), as shown in Table 4.

Regarding the accessibility dimension, 84% of non-adherent patients had difficulties with the care procedures and paperwork. Also, the same percentage of patients considered that the waiting time for a new appointment was long. Eighty-four percent did not attend the consultation due to lack of money. Seventy-six percent had difficulties in complying with the date and time of the service and 6% of the participants were refused the service the previous year. In addition, 80% both adherent and non-adherent patients did not take their medicine because of lack of money to buy it at some point. The bivariate analysis identified a statistically significant relationship between the accessibility dimension and adherence (Spearman's Rho: 0.744; p=0.000), as shown in Table 5.

With regard to the acceptability dimension, the high percentage of fear or embarrassment of being treated at the hospital is evident in both adherent and non-adherent patients (80% and 62% respectively). Regarding non-adherent patients, 76% considered that the treatment would not cure their disease; 58% did not trust the health personnel who attended them and 80% reported not having a good relationship with the health personnel. The bivariate analysis showed a correlation between the acceptability dimension and adherence (Spearman's Rho: 0.607; p=0.000), as shown in Table 6.

Finally, regarding the contact dimension, 80% of the non-adherent population rate the quality of the health service and the treatment received as not good. 64% of patients stated that health personnel did not solve their concerns about their illness and/or treatment. Seventy-one per cent said that health personnel had not explained what the treatment was aboutto them and 80% stopped taking anti-tuberculosis drugs at some point. The bivariate analysis also showed a correlation between the contact dimension and adherence (Spearman's Rho: 0.693; p=0.000), as shown in Table 7.

Table 3: Characteristics of the population and treatment adherence

Characteristics	Treatmentadherence				
	Adherence n=75		Non-adherence n=45		
	n	%	n	%	P value
Gender					
Male	51	68,0	14	31,1	**0,000**
Female	24	32,0	31	68,9	
Civil status					
Without partner	43	57,3	0	0	*0,000*
With partner	32	42,7	45	100	
Schooling					
Without or low level education	75	100	30	66,7	*0,000*
Highleve ofeducation	0	0	15	33,7	
Work modality					
Dependent	54	72,0	20	44,4	*0,030*
Independent/self-employment	21	28,0	25	55,6	
Family income					
Up to200 dollars	57	76,0	20	44,4	*0,000*
From 201 to 420 dollars	18	24,0	25	55,6	

Table 4: Barriers to accessing health care regarding the availability dimension and treatment adherence

Health facility barriers Availability		Adherent n= 75		Non-Adherent n= 45		Spearman's Rho	P value
		n	%	n	%		
Do you know the available services in the hospital?	Yes	58	77,3	13	28,9	0,477	0,000
	No	17	22,7	32	71,1		
Do you think the environments where you receive treatment are comfortable and clean?	Yes	65	86,7	5	11,1	0,742	0,000
	No	10	13,3	40	88,9		
Do you consider that there are adequate materials and equipment to receive treatment?	Yes	66	88,0	16	35,6	0,546	0,000
	No	9	12,0	29	64,4		
Do you consider that the health workers are trained to perform care?	Yes	43	57,3	12	26,7	0,298	0,001
	No	32	42,7	33	73,3		
Do you consider that there are enough health personnel to ensure patients care in the hospital?	Yes	38	50,7	10	22,2	0,281	0,002
	No	37	49,3	35	77,8		
At some point, did you not receive care because of lack of health personnel?	Yes	61	81,3	17	37,8	0,442	0,000
	No	14	18,7	28	62,2		
Do you think the opening times are adequate for the service?	Yes	58	77,3	13	28,9	0,447	0,000
	No	17	22,7	32	71,1		
Did you receive timely careduring your medical consultations and control examinations?	Yes	59	78,7	10	22,2	0,553	0,000
	No	16	21,3	35	77,8		
Did you receive any information about your disease by the health personnel?	Si	43	57,3	12	26,7	0,298	0,01
	No	37	42,7	33	73,3		
Global correlation per dimension						0,694	0,000

Table 5: Barriers to accessing health care regarding theaccessibility dimension and treatment adherence

Health Facility Barriers Accesibility		Adherent n= 75		Non-adherent n= 45		Spearman's Rho	P value
		n	%	n	%		
The time you take to get to the hospital is more than 30 minutes.	Yes	24	32,0	19	42,2	-0,103	0,262
	No	51	68,0	26	57,8		
You use public transport to get to the hospital	Yes	57	76,0	36	80,0	-0,46	0,615
	No	18	24,0	9	20,0		
You had some difficulties with paperwork to receive care.	Yes	14	18,7	38	84,4	0,643	0,000
	No	61	81,3	7	15,6		
It has been more than two weeks from the day you requested the last appointment until the day you received care.	Yes	62	82,7	39	86,7	-0,053	0,565
	No	13	17,3	6	13,3		
You consider the time you waited from the day you requested the appointment until the day you received care adequate.	Yes	62	82,7	7	15,6	0,657	0,000
	No	13	17,3	38	84,4		
You consider the waiting time to receive care in the services of laboratory and radio-diagnosis adequate.	Yes	45	60,0	11	24,4	0,345	0,000
	No	30	40,4	34	75,6		
You paid for the consultations or any medical service.	Yes	56	74,7	25	55,6	0,304	0,000
	No	19	25,3	20	44,4		

You paid for the diagnosis service.	Yes	56	74,7	25	55,6	0,300	0,000
	No	19	25,3	20	44,4		
At some point, you did visit your health care provider due to lack of money.	Yes	60	80,0	38	84,4	0,628	0,000
	No	15	20,0	7	15,6		
You bought medicaments for your treatment that are not for tuberculosis.	Yes	56	74,7	11	24,5	0,490	0,000
	No	19	25,3	34	75,6		
At some point, you did not take your medicaments because of lack of money to buy them.	Yes	60	80,0	37	82,2	0,608	0,000
	No	15	20,0	8	17,8		
You had some difficulties with the dates of the scheduled consultations.	Yes	44	58,7	34	75,6	0,333	0,000
	No	31	41,3	11	24,4		
You have been denied a health service during last year.	Yes	60	80,0	27	60,0	0,406	0,000
	No	15	20,0	18	40,0		
GLOBAL CORRELATION PER DIMENSION						**0,744**	**0,000**

Table 6: Barriers to accessing health care regarding the acceptability dimension and treatment adherence

Health facility barriersacceptability		Adherent n= 75		Non-Adherent n= 45		Spearman's Rho	P value
		n	%	N	%		
At some point, you felt afraid or ashamed of being treated at the hospital.	Yes	60	80,0	28	62,2	0,426	0,000
	No	15	20,0	17	37,8		
At some point, you have felt discriminated or rejected due to your disease.	Yes	63	84,0	29	64,4	0,495	0,000
	No	12	16,0	16	35,6		
It would be hard if a neighbor or relative knew that you have a health issue.	Yes	43	57,3	28	62,2	0,189	0,038
	No	32	42,7	17	37,8		
You consider that the prescribed treatment is going to cure your disease.	Yes	47	62,7	11	24,4	0,370	0,000
	No	28	37,3	34	75,6		
You consider the health personnel that assist you have enough knowledge to cure your disease.	Yes	47	62,7	11	24,4	0,375	0,000
	No	28	37,3	34	75,6		
You trust the health personnel that you receive care from.	Yes	59	78,7	19	42,2	0,372	0,000
	No	16	21,3	26	57,8		
The relationship with the health personnel that treat you is good.	Yes	45	60,0	9	20,0	0,389	0,000
	No	30	40,0	36	80,0		
GLOBAL CORRELATION PER DIMENSION						**0,607**	**0,000**

Table 7: Barriers to accessing health care regarding its contact dimension and treatment adherence

Health facility barriers contact		Adherent n= 75		Non-Adherent n= 45		Spearman's Rho	P value
		n	%	n	%		
You think the service quality is good.	Yes	46	61,3	9	20,0	-0.194	0,033
	No	29	38,7	36	80,0		
You think the received treatment is good.	Yes	45	60,0	9	20,0	0,389	0,00
	No	30	40,0	36	80,0		
The health personnel answered your questions and doubts regarding your disease and/or treatment.	Yes	66	88,0	16	35,6	0,546	0,000
	No	9	12,0	29	64,4		
You have had some discomfort attributable to the anti-tuberculosis medication you were taking.	Yes	45	60,0	33	73,3	0,323	0,000
	No	30	40,0	12	26,7		
The health personnel explained what was your disease about.	Yes	64	86,5	18	40,0	0,487	0,000
	No	10	13,5	27	60,0		
The health personnel explained what was the treatment about	Yes	42	56,0	13	28,9	0,263	0,004
	No	33	44,0	32	71,1		
You were satisfied with the explanation.	Yes	42	56,0	13	28,9	0,261	0,000
	No	33	44,0	32	71,1		
You stopped taking your anti-tuberculosis medication at some point.	Yes	28	37,3	36	80,0	-0,414	0,000
	No	47	62,7	9	20,0		
The reason why you stopped taking your anti-tuberculosis medication was the discomfort due to the treatment.	Yes	16	21,3	21	46,7	-0,266	0,003
	No	59	78,7	24	53,3		
The reason why you stopped taking your anti-tuberculosis medication was thelength of the treatment.	Yes	23	30,7	26	57,8	-0,267	0,002
	No	52	69,3	19	42,2		
The reason why you stopped taking your anti-tuberculosis medication was that you did not feltbetter.	Si	19	25,3	33	73,3	-0,469	0,000
	No	56	74,7	12	26,7		
GLOBAL CORRELATION PER DIMENSION						**0,693**	**0,000**

DISCUSSION

In 2018, the Callao region reported 1992 cases of pulmonary tuberculosis, which contributed with 12.6% of the national disease burden for that period, expressed in an incidence rate of 191.8 cases per 100,000 inhabitants, with high levels of irregularity and abandonment of treatment of drug-susceptible TB and MDR TB, making it a situation of serious epidemiological risk for the jurisdiction. This fact drives the need to identify the most common barriers to access to available health services. Taking this into consideration, health priorities should be oriented to the decrease of the endemic disease's impact and the reduction in the cases among the most vulnerable people[27].

The health system's objective is to provide access to health services according to the needs of the population and their satisfaction with the care they receive, improving their quality of life and their health level. A variety of factors explain the benefits and health access limitations regarding care services, which are the results of exposure to health risks. Many efforts to improve the situation are hampered by an inability to implement measures to promote health access. The most important cause is the lack of knowledge of the barriers that produce it, which prevents the identification of priorities in the field of health. Therefore, it is difficult to define the interventions that are cost effective against the diseases that cause the highest burden of morbidity and mortality, such as tuberculosis[22].

The first global health challenge is the control of tuberculosis, the second is its eradication. That requires an effective multisectoral and intersectoral response, which can reduce health inequities; however, in order to do that, health services must first provide accessible and quality care that meets users' expectations[3,8]. Nevertheless, it is necessary to clarify that what was stated above does not mean that the responsibility is on health professionals and technicians, or on those affected; hence, the answers must be sought in a broader scenario.

The study's findings confirm that there are multiple barriers faced by patients with tuberculosis when seeking adequate care and affect treatment adherence, which is fundamental to ensure their cure and prevents the aggravation of the patient's health and the risk of contagion. In addition, these barriers increase the complications and conditions that lead to unnecessary increased costs of care and even the death of the patient[4-6,8,11].

We will analyze some relevant socio-demographic characteristics of the population. The data obtained in relation to age and sex, coincide with the results found by other studies (2,9,28,29), which show a predominance of men over women, as well as a higher percentage of subjects in the range of 18 to 47 years old. Rieder[30], in regard to age, stated that the trend shows that there is a higher incidence which increases with age, a situation that could be explained by the cumulative increase in the prevalence of tuberculosis infection and therefore subjects of economically active age are the most susceptible to disease progression; and on sex he provided data completely opposite to the findings. It appears that there are differences in the probability of developing tuberculosis between men and women, and offered results from Puerto Rico, Denmark and Cambodia, where the risk of disease in those infected was found to be higher in women. His results coincide with the epidemiological data on the behavior of tuberculosis in Peru and the Callao region[18,27].

The 37.5% of the studied subjects were non-adherent to treatment and 68.9% of them were women. However, Arrosi et al[29] and Rivera et al[2], found male predominance in their research, although it is important to highlight the differences in methodologies and measurement instruments between these studies. Gómez et al[31], and Guarnizo et al[32], help us to understand this situation better through the gender inequity in access to health care; expressing that the structural barriers to access for women occur because they require more attention and incur greater expenses than men to maintain their health. In addition, working conditions and the economic capacity that they have, place them at a greater disadvantage than men in terms of access to health services.

Access to a range of services represents, for those affected by tuberculosis, the opportunity to make a culture of quality health viable, expressed through health protection - prevention, promotion, recovery and rehabilitation - aimed at universal coverage as the only way to expect the disease contro[3,33]. For some countries these changes are a long-term aspiration, so it is convenient to obtain information about the barriers that prevent this process. Hence, this study was based on four dimensions of access to health services: availability, accessibility, acceptability, contact. We sought to know their relationship with treatment adherence and as it was evidenced, there is a considerable positive correlation.

Hirmas[22], identified 230 barriers by using the Tanahashi model to evaluate access equity and barriers to achieving universal health coverage. Thirty-eight percent of these barriers corresponded to the acceptability dimension, 29% to accessibility, 22% to contact and 11% to availability. Something similar was expected when applying the same model in tuberculosis, as long as it was adapted to the conditions and scenario in which the disease develops, as was done in this research. Thus, the provided knowledge is fundamental to understand the conceptualization and dynamics of the multidimensional causes of treatment adherence. That understanding makes continuous improvement of quality of care possible to ensure the existence of the services, and then, the provision of what is necessary so that the patients can use those services, supporting the ability of the services to respond to the needs of the external user and motivating patients to use them appropriately and thus, covering the demands of the affected patients for their expectations and perceptions of the care received[34].

The study, seen from the perspective of the availability dimension, encourages there enforcement of health services' organization and management increasing their financing to improve resolution capacity and respond to health priorities, developing technical and political capacities[35]. This decision was based on the information gathered, which showed the behavior of some indicators in that dimension that had a higher correlation with adherence, such as not considering the environments

where care is received to be comfortable and clean, and not receiving timely attention for medical consultations and follow-up examinations. Similarly, Hirmas et al[22] identified other very important barriers: lack of resources, infrastructure, opening times for care and medicines, lack of information, and lack of education and training of medical teams.

Regarding the accessibility dimension, 42.2% of non-adherent patients reported spending more than 30 minutes to go from home to the hospital, with a median of 65 minutes and 39% had difficulties with transportation. That is widely consistent with the reported literature, where the likelihood that a patient will attend a health care facility decreases as the distance from the residence to the health care facility increases, and this has implications for achieving the goal of equal access for all patients[4]. Even in the United States, federal regulations recommend that service users who are elderly people travel less than 30 minutes to appropriate facilities[36].In Peru, a study undertook by Seclen et al[37] on access to health services determined that about 25 % of users took more than 30 minutes from their homes to the hospital.

The accessibility dimension also identified elements such as the financial burden related to additional costs associated with care, such as medications, tests, or transportation to the facility. The participants recognized this problem as one obstacle, which means an impoverishment of the patient and impacts negatively on treatment adherence, as mentioned by several studies[3,4,6,14]. Thus, there is a need to subsidize these costs, since not ensuring timely access would have implications for public health within the framework of the objectives of universal health coverage and sustainable development goals[11,15,23,38].

It was also found that the waiting time between getting an appointment and medical care was long. Waiting times are factors that influence user satisfaction with the service. In a study conducted by Pedraza et al[39] in Mexico, the evaluated waiting times were considered to be very bad, due to the insufficient number of employees to attend the patients. ikewise, in Colombia, in an investigation carried out by Rodríguez et al[40], it was found that there were administrative barriers such as waiting times and the opportunity for service as a product of poor health system design that causes negative perceptions and harmful effects for both users and their families. Similar results were found in a study in Peru, where health personnel have to perform multiple functions, including administrative ones, which decreases the time for care of those affected by tuberculosis[28].

Shimabuku et al[41], suggested some measures to ensure services accessibility such as care process improvement to reduce delayed appointments and diagnostic and/or therapeutic procedures; training courses in good treatment of the user and organizational climate. Arakawa et al[4] proposed that other ways of contributing to adherence to tuberculosis treatment are to maintain regular control consultations, comply with counseling and accompaniment during treatment. In addition, one aspect that cannot be neglected is to expedite care whenever patients need it.

The data found so far regarding the dimensions of availability and accessibility, allow us to analyze the situation from a service provision perspective; but from this moment we will cover the dimensions of acceptability and contact, which offer an analysis of the service by the patients demand.

In terms of acceptability, the findings suggested that there are contextual barriers that prevent the arrival of those with TB and if not addressed, they may make treatment adherence difficult. These include fear or embarrassment when seeking care in a health service and distrust of health teams and prescribed treatment. Certainly within that framework, aspects such as stigma and discrimination must be considered, as well as trust in the health personnel in charge of care. Understanding the determinants of access can help health care teams to deliver the support required by patients to achieve treatment success, as well as to develop and evaluate specific interventions for patient care[4,19]. Restrepo et al[42] and Arivillaga et al (43), proposed alternatives such as training, population and health personneleducation, and external support in the community and available social networks to the user. Llanos[3], stated that the approach to tuberculosis has a social basis, based on political commitment and supervised treatment, but by not facing barriers such as discrimination, its results can end up in insufficient effort. Plata[9], considered that inferiority feelings, disability and personal abandonment were relevant, which affect treatment adherence in a decisive way, hence the need for psychological support and sufficient social support.

For this reason, the programs to combat the disease should consider tuberculosis more than a clinical-epidemiological problem, it is a social problem because it is a cause and a consequence of poverty. Therefore, they must ensure that those who are tuberculosis patients have access to health services not only through what is offered programmatically- prevention, diagnosis and treatment for tuberculosis- but also to receive effective health and social support, in the health services in general, in a context of truly comprehensive health care, because they may present comorbidities that, when not adequately addressed, affect treatment fidelity[3,28].

The analysis of the contact dimension allowed us to evaluate the perception of the interviewee and his or her value judgement about the care received, as an essential part to be considered in the access to tuberculosis treatment. This representation of the quality of the service is a construct in which the patient compares his or her expectations with the perception of the execution of thecare process. In this perspective, the facts identified in this study, such as not knowing aspects of the disease, diagnosis, treatment duration, medicines included in the scheme, lack of health personnel-patient communication and not being satisfied with the explanations, allowed us to evidence a degree of dissatisfaction related to the lack of treatment adherence[1,7,24].

These barriers highlight the obligation of health services to adequately characterize the elements that contribute to treatment adherence and to explore new strategies, as well as to consolidate those under development. First, addressing the problems of

fragmentation and segmentation of the health system, and second, the use of services through the full implementation of the model of comprehensive health care and universal insurance are significantly important for obtaining access to quality health services[26, 44].

None of the above will be effective if accompanied by inefficient health facilities that limit access to clinical and social care benefits. Although it is important to provide immediate solutions to direct problems of diagnosis and treatment, through tuberculosis control programs, it is crucial to highlight that universal health coverage and access to essential health services are the ones which will enable sustainable control.

This study did not investigate barriers to access to services from the perspective of health providers or human resources, nor did it address the social determinants of access and their link to living conditions. However, it provides valuable information on the challenges faced by tuberculosis patients in a high-burden area such as the Callao Region, which will be useful to generate health policies that contribute to their control.

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