Research Article

Factors Related To Disability Inclusive Public Transport In A City In Peru

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Abstract: Aims: In Latin America and the Caribbean, a large percentage of the urban and interurban transport service remains inaccessible for citizens with a disability. In Peru, citizens with complex disabilities have been made invisible in the public transport service. The objective of this research is to determine the relationship between the management of inclusive urban public transport and the accessibility of persons with disabilities in the city of Trujillo, 2020, and how public management impacts on this group of citizens.
Methodology: A questionnaire was used based on the dimensions of each variable. The variables were: Inclusive urban public transport management composed of 5 dimensions (equipment and services, adapted vehicles, preferential rate, regulatory compliance, state of the roads) and accessibility of people with disabilities, composed of 5 dimensions (physical environment, attitudinal, social activities, mobility, comfort). Spearman's rank correlation was used.
Results: The results allowed identifying that the management of inclusive urban public transport in the city of Trujillo has a predominantly deficient level, and the accessibility of people with disabilities is mainly poor.
Conclusion: A direct and significant relationship was evidenced between the management of inclusive urban public transport and its dimensions (equipment and services, adapted vehicles, preferential rates, regulatory compliance, state of the roads) with the accessibility of people with disabilities in the city of Trujillo. Social activities, mobility and comfort, as well as preferential rate, normative compliance and state of the roads are decisive for the study of the relationship between the management of inclusive urban public transport and accessibility for the disabled.

Keywords: Management; dimensions; means of transport; inclusion; disabled.

Introduction

Currently, the public transport system has evolved in terms of inclusion and accessibility. The UN, among its Sustainable Development Goals (SDG), recognizes that safety must be guaranteed for all users of public transport, essentially passengers with reduced mobility. Remember that the vast majority of them do not have access to their own means of transportation. We refer to the population, with disabilities and special needs, it is gaining visibility and in turn increasing in statistics, and therefore, it is necessary to give them access to public transport systems that are focused on providing quality and good service. The European Union (EU) has received a complaint from the Spanish Committee of Representatives of People with Disabilities (CERMI), the reason being that its member countries are far from guaranteeing mobility, freedom and safety of their movements to the population with disabilities Not only that, they also tolerate, with guilt, new threats to this fundamental right, such as the anarchic and harmful invasion of new mobility elements such as small electronic movement devices [1].

There is a lack of management tools for the provision of relevant budgets and funding mechanisms that involve implementing regulations and expertise that contribute to inclusive human advancement. Also, models the effective analyzes with specific indicators which can contribute to effectively monitor inclusion [2]. Accessible transport is a key factor in access to essential urban resources and services, including housing, employment, social welfare, and recreation. It is importance to be inclusive of the needs of individuals with disabilities in the design of the built environment, urban facilities and services, to enhance the quality of life for all, and thus support community integration [3] (Sze and Christensen, 2017). In Latin America and the Caribbean (LAC), a large percentage of urban and interurban transport service remains inaccessible for citizens with a disability. In Peru each season the number of citizens with some kind of disability, be it sensory, psychological or physical, is increasing. In the Register of Persons with Disabilities of the National Register of Persons with Disabilities - RNPCD, in the first quarter of 2020, 299,280 persons with disabilities have been incorporated. From this research it was possible to obtain that of the total population 32, 625 948 (89.7% Without disability) 10.3% (3 million 351

thousand 919) have some disability where women represent (56.7%) 1 901 220 and men (43.3%) 1,450 699. 31.2% of people who have some kind of disability reside in Lima and 5.2% in the department of La Libertad.

In the city of Trujillo, citizens with a complex disability have been made invisible in the public transport service, given that the apathy of many drivers and of those who are in charge of collecting the passage in these units do not provide a good service to citizens who use wheelchairs, as well as citizens who are blind, deaf or mute, making it difficult for these people to move around the city. Therefore, in the public transport system, the renegotiation of contracts with intermediaries is required, requiring comprehensive accessibility in transports in this category. On the other hand, in private transport, a better control and sanction is also required in the absence of accessibility. From a theoretical perspective, an approach is made to the concepts associated with the monitoring of inclusive urban public transport and the accessibility of citizens with disabilities, since these citizens are directly marginalized as a consequence of the lack of affordability in urban land transportation However, current regulations are unknown or are not met by transport operators. In this sense, the objective of this research is to determine the relationship between the management of inclusive urban public transport and the accessibility for the disabled in the city of Trujillo, 2020.

Materials and Methods

Design of the Investigation

The study was carried out in the city of Trujillo, Peru in 2020. The population in this study was made up of workers from the Municipal Office of Attention to People with Disabilities (OMAPED), workers from the Transport Management of the Regional Government of La Libertad and disabled (see Table 1). The sample was 196 people (see Table 2). The independent variable was; management of inclusive urban public transport, and the dependent variable was; accessibility for the disabled.

Table 1. Distribution of OMAPED workers, Transport Management of the Regional Government of La Libertad and disabled from the Trujillo district, 2020

Condition	Sex		Total
	Men	Women	
OMAPED workers	6	4	10
GRT La Libertad workers	12	8	20
Disabled	33836	38003	71839
Total	33854	38015	71869

Table 2. Distribution of the sample of OMAPED, GRT workers and disabled in the Trujillo district, 2020

Condition	Sex		Sex
	Men	Men	
OMAPED workers	6	4	10
GRT La Libertad workers	12	8	20
Disabled	80	86	166
Total	98	98	196

The survey technique was used. The questionnaire was developed based on the dimensions of each variable. Variable 1: Management of inclusive urban public transport; it was made up of 5 dimensions: equipment and services, adapted vehicles, preferential rates, regulatory compliance, state of the roads; totaling the amount of 30 items. This service implies that every person, regardless of sex, age or location, has the freedom to access this service, not denying this service to citizens with foreign origin, different culture and, of course, to citizens who have a disability. In short, it must be a service that does not provide requirements when entering, as well as to exclude a certain sector of the population and in order to ensure that the rights to equal conditions and collaboration are fulfilled. All people must benefit from a service adapted to their needs [4]. Variable 2: Accessibility for the disabled; it is composed of 5 dimensions: physical environment, attitudinal, social activities, mobility, comfort; totaling the amount of 30 items. In this regard, Pérez [5] points out that it is the integral participation of all people regardless of their physical or cognitive abilities, that is, regardless of whether they have a disability or not, within daily life. This, in reality, is afflicted by people with disabilities, since there are accessibility difficulties in the physical context, which prevents or hinders their mobility, communication and penetration, damaging the social unification that allows them to have independence in their day to day.

Statistical analysis

The analysis of the relationship between the management of inclusive urban public transport and the dimensions of equipment and services, adapted vehicles, preferential rate, regulatory compliance, state of roads with accessibility for the disabled in the city of Trujillo, 2020 was carried out using Correlation by ranges of Spearman and factorial analysis, whose model is defined as follows (for details [6]):

$$X_1 = l_{11}F_1 + l_{12}F_2 + ... + l_{1m}F_m + \varepsilon_1$$
$$X_2 = l_{21}F_1 + l_{22}F_2 + \cdots + l_{2m}F_m + \varepsilon_2$$
$$X_p = l_{p1}F_1 + l_{p2}F_2 + \cdots + l_{pm}F_m + \varepsilon_p$$

that we can express in a matrix form as: $\boldsymbol{X} = Lf + \varepsilon$ where:

X is the vector of the original variables.

L is the factor matrix. Collect the factorial loads or (saturations).

l_{ih} is the correlation between variable j and factor h.

f is the vector of common factors.

ε is the vector of unique factors.

Since both common and specific factors are hypothetical variables, it is assumed, to simplify the problem, that:

a. The common factors are variables with zero mean and variance 1. Furthermore, they are assumed to be unrelated to each other.

b. Unique factors are variables with zero mean. Their variances can be different. They are supposed to be unrelated to each other. Otherwise the information contained in them would be in the common factors.

c. Common factors and unique factors are unrelated to each other. This hypothesis allows inferences to be made that distinguish between common and specific factors.

Based on the model and the hypotheses formulated, it can be shown that the variance (information contained in a variable) of each variable can be decomposed into: that part of the variability that is explained by a series of common factors with the rest of variables called the commonality of the variable and the part of the variability that is specific to each variable and that, therefore, is not common with the rest of the variables. This part is called the unique factor or specificity of the variable.

$$Var(X_j) = l = l_{j1}^2 Var(F_1) + l_{j2}^2 Var(F_2) + \cdots + l_{jm}^2 Var(F_m)$$
$$Var(\varepsilon_j) = l_{j1}^2 = l_{j2}^2 + l_{jm}^2 + Var(\varepsilon_j)$$

l_{jh}^2 represents the proportion of total variance of the variable X_j explained by the factor *h.*

$h_j^2 = l_{j1}^2 = l_{j2}^2 + l_{jm}^2$ is the commonality of the variable X_j and represents the proportion of variance that the different factors as a whole explain of the variable X_j. It is, therefore, the portion of that variable that comes into contact with the rest of the variables. It varies between 0 (the factors do not explain anything of the variable) and 1 (the factors explain 100% of the variable).

$Var(\varepsilon_j)$ is what we call specificity and represents the contribution of the single factor to the total variability of X_j.

$l_{1h}^2 + l_{2h}^2 + \cdots + l_{ph}^2 = g_h$ It is what is called eigenvalue (eigenvalue) and represents the ability of the factor h to explain the total variance of the variables. If the original variables were typified, the total variance would be equal to p and g_h/p representaría el porcentaje de varianza total atribuible al factor h.

The objective of the factor analysis is, therefore, to obtain the common factors so that they explain a good part of the total variability of the variables. All analyzes were performed using R software [7].

Results and discussion

Results Description

Table 3 shows that 58.7% of the workers of OMAPED, the Transport Management of the Regional Government of La Libertad and disabled from the Trujillo district consider a deficient level of inclusive urban public transport management, while the 29.1% consider a regularly efficient level and 12.2% an efficient level. Consequently, it is identified that the management of inclusive urban public transport in the city of Trujillo has a predominantly deficient level. This coincides with what Lucero [4] points out, regarding the management of public transport, this service implies that everyone, regardless of sex, age or location, has the freedom to access this service, nor denying this service to citizens with foreign origin, different culture and, of course, disabled citizens.

Table 4 shows that the level that has preponderance in the dimensions of inclusive urban public transport management is the deficient level, in the percentages described below: equipment and services with 64.3%, adapted vehicles with 56.6%, preferential rate with 50.5%, regulatory compliance with 48%, state of the roads with 52.6%. In this sense, for the Bolivian Ombudsman's Office [8], urban transport must be under quality, safety and equity standards, ensuring that the entire population has access in equal contexts, including citizens with any

type of disability; In another context, it is necessary to have a generalized sanction for those who do not respect this right of users, regulating it as a serious offense, if the movement of disabled citizens in transport that has places for this purpose is denied.

Table 5 shows that 57.2% of the workers of OMAPED, Transport Management of the Regional Government of La Libertad and disabled from the Trujillo district consider a poor level of accessibility for the disabled, while the 30.6 consider a regular level and 12.2% a good level. Consequently, it is identified that the accessibility for the disabled in the city of Trujillo has a predominantly poor level. In relation to these results, it is worth adding what Pérez [5] maintains about the integral participation of all people regardless of their physical or cognitive abilities, that is, regardless of whether they have a disability or not, within daily life.

Table 3. Levels of inclusive urban public transport management in the city of Trujillo, 2020

Levels	Inclusive urban public transport management	
	f	**%**
Deficient	115	58.7
Regularly efficient	57	29.1
Efficient	24	12.2
Total	196	100

Table 4. Levels of the dimensions of inclusive urban public transport management in the city of Trujillo, 2020

Levels	**Equipment and services**		**Adapted vehicles**		**Preferential rate**		**Regulatory compliance**		**State of the roads**	
	f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**
Deficient	126	64.3	111	56.6	99	50.5	94	48	103	52.6
Regularly efficient	46	23.5	57	29.1	69	35.2	74	37.7	62	31.6
Efficient	24	12.2	28	14.3	28	14.3	28	14.3	31	15.8
Total	196	100	196	100	196	100	196	100	196	100

Table 5. Accessibility levels of disabled in the city of Trujillo, 2020

Levels	**Accessibility for the disabled**	
	f	**%**
Poor	112	57.2
Regular	60	30.6
Good	24	12.2
Total	196	100

Table 6 shows that the level that predominates in the dimensions of accessibility for the disabled is the bad level, in the percentages described below: physical environment with 56.6%, attitudinal with 58.2%, social activities with 55.6 %, mobility with 57.2% and comfort with 58.7%. Based on these results, we should take what was indicated by Alonzo [9], when he states that accessibility can be between means or instrument, it facilitates people to carry out their daily activities normally.

Table 6. Levels of the dimensions of accessibility for the disabled in the city of Trujillo, 2020

Levels	**Physical environment**		**Attitudinal**		**Social activities**		**Movility**		**Comfort**	
	f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**
Poor	111	56.6	114	58.2	109	55.6	112	57.2	115	58.7
Regular	56	28.5	55	28.1	59	30.1	56	28.5	48	24.5
Good	29	14.9	27	13.7	28	14.3	28	14.3	33	16.8
Total	196	100	196	100	196	100	196	100	196	100

Correlation of Variables

Below is the relationship of inclusive urban public transport management and its dimensions (equipment and services, adapted vehicles, preferential rate, regulatory compliance, state of the roads) with the accessibility for the disabled in the city of Trujillo, 2020. Table 7 shows that there is a direct and significant relationship (P <.01) between the management of inclusive urban public transport and its dimensions (equipment and services, adapted vehicles, preferential rates, regulatory compliance, state of the roads) with the accessibility of people with

disabilities in the city of Trujillo, 2020. The results related to the relationship between the management of inclusive urban public transport with the accessibility for the disabled can be contrasted with what was found by Poveda et al [10] who They point out that there is an important part of information for the development of this service and the transfer pattern and inconveniences that citizens with a disability face in the city of Tunja, in Colombia. Likewise, based on the relationship between the management of inclusive urban public transport through equipment and services and the accessibility for the disabled, these results can be contrasted with what was found by Sáez [11], in his study in the city of Santiago de Chile, who concludes that the problem should be considered when planning an urban mobility policy, that is, contemplating the urbanization process that develops in parallel. In that order, the relationship found between the management of inclusive urban public transport through adapted vehicles and the accessibility for the disabled coincides with that reported by Loyola et al [12], who conclude that the perception of the large number of neglected citizens with appropriate situations, since the system that is currently offered contains restrictions and dissatisfaction on the part of the citizen. With regard to the relationship between the preferential rate and the accessibility for the disabled, these results are related to what Santiago found [13], who concludes that the rights of citizens whose motor disability has forced them to use have been violated. Wheelchair. Similarly, based on the relationship between regulatory compliance and accessibility for the disabled reported in this research, Gento and Elorduy [14], conclude that there have been important advances in the city of Valladolid with the adaptation of its transport public still without fully complying with accessibility requirements established by current regulations. Likewise, the relationship found between the good condition of the roads and the accessibility for the disabled agrees with what was reported by Navarrete [15], who concludes that there are many key elements that can be of support for mobilization. It is importance to be inclusive of the needs of individuals with disabilities in the design of the built environment, urban facilities and services, to enhance the quality of life for all, and thus support community integration [3]. Likewise, perceived environment, safety and security also affect trip characteristics with respect to trip frequency, trip time and transport mode, of the elderly. Maintenance and management of the footpath, accessible route, bus stop and the surrounding environment are essential [16,17, 18].

Accessibility, then, are rights that articulate and enhance the positive enjoyment of other rights so that citizens with disabilities participate fully in society, and can live autonomously, exercise their right as citizens in an equal manner. Thus implying access to mass urban transport systems for individuals with physical and hearing disabilities, this being an essential right among the various goods, services and products, which should be conceived or have accessibility to reduce the discriminatory levels existing in the disabled citizens. Finally, through factor analysis it was possible to reduce the number of original dimensions to two (2), which together explain 93.03% of the variability in accessibility for the disabled, which includes the dimensions (social activities, mobility and comfort) and dimensions (preferential rate, normative compliance and state of the roads) which are decisive for the study of the relationship between the management of inclusive urban public transport and accessibility for the disabled in the city of Trujillo, 2020 (table 8).

Table 7. Relationship of inclusive urban public transport management and its dimensions (equipment and services, adapted vehicles, preferential rate, regulatory compliance, state of the roads) with the accessibility for the disabled in the city of Trujillo, 2020

Inclusive urban public transport management	**Accessibility for the disabled**	
	Spearman rank correlation	
	Coefficient	***P* value**
	0,935**	.000
Equipment and services	0,793**	.000
Adapted vehicles	0,783**	.000
Preferential rate	0,864**	.000
Normative compliance	0,834**	.000
State of the roads	0,836**	.000
n = 196		

Table 8. Factors that determine the relationship between the perception of family support and the quality of life of patients with type 2 diabetes mellitus at the Level I Primary Care Center, Chicama in times of Covid 19.

Factor 1	**Factor 2**
Preferential rate	Social activities
Normative compliance	Movility
State of the roads	Comfort
Explained variance =87,90%	**Explained variance =5,13%**

Conclusion

It was identified that the management of inclusive urban public transport in the city of Trujillo has a predominantly poor level, and the accessibility for the disabled is mainly poor. It was evidenced that there is a direct and significant relationship between the management of inclusive urban public transport and its dimensions (equipment and services, adapted vehicles, preferential rates, regulatory compliance, state of the roads) with the accessibility for the disabled in the city of Trujillo. It is recommended to train and sensitize the population in respecting the rights of people with disabilities in relation to the use of means of transport, and people with disabilities are exhorted, report any abuse or violation of their rights, making it known public so that the respective sanctions are applied and the corrective measures are adopted. The dimensions social activities, mobility and comfort, as well as, preferential rate, normative compliance and state of the roads they are decisive for the study of the relationship that the management of inclusive urban public transport has with accessibility for the disabled.

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