ORIGINAL

Inequality in Access to Healthcare: A Latin American Perspective

Desigualdad en el acceso a la atención sanitaria: Una perspectiva latinoamericana

Carolina Henao[1] ✉, Jenny Paola Lis-Gutiérrez[1], Melissa Lis-Gutiérrez[2]

[1]Fundación Universitaria Konrad Lorenz. Bogotá, Colombia.
[2]Universidad Nacional de Colombia. Bogotá, Colombia.

ABSTRACT

Introduction: inequality in access to healthcare is a significant issue globally, with disparities in access to health services, health outcomes, and health-related behaviors. Latin America is known for its income and wealth inequality, and perceptions of inequality in health services during the COVID-19 pandemic are crucial to consider in formulating public policies in this sector.
Objective: to determine the factors associated with the perception of inequality and access to health services in Latin America in 2020.
Methods: the study uses data from the 2020 Latinobarómetro and focuses on socio-demographic, perception, and access to health services factors. Three supervised learning algorithms were used: logit regression with Lasso regularization algorithm, decision tree, and random forests.
Results: the study found that the factors associated with the perception of inequality and access to health services in Latin America in 2020 include age, education, income, health insurance, and type of healthcare facility used.
Conclusions: the study provides valuable insights into the perception of inequality associated with access to health systems in Latin America, one of the world's most unequal regions. Public policies addressing this issue would positively influence Latin Americans' objective and subjective quality of life. However, there is a need for more consensus on appropriate indicators for measuring access to health, and more studies analyzing access to health services during the pandemic and users' perception are necessary.

Keywords: Latin America; Accessibility to Health Services; Social Inequality.

RESUMEN

Introducción: la desigualdad en el acceso a la atención médica es un problema significativo a nivel mundial, con disparidades en el acceso a servicios de salud, resultados de salud y comportamientos relacionados con la salud. América Latina es conocida por su desigualdad de ingresos y riqueza, y las percepciones de desigualdad en los servicios de salud durante la pandemia de COVID-19 son cruciales para considerar en la formulación de políticas públicas en este sector.
Objetivo: determinar los factores asociados con la percepción de desigualdad y acceso a servicios de salud en América Latina en 2020.
Métodos: el estudio utiliza datos del Latinobarómetro 2020 y se centra en factores socio-demográficos, de percepción y acceso a servicios de salud. Se utilizaron tres algoritmos de aprendizaje supervisado: regresión logística con algoritmo de regularización Lasso, árbol de decisiones y bosques aleatorios.
Resultados: el estudio encontró que los factores asociados con la percepción de desigualdad y acceso a servicios de salud en América Latina en 2020 incluyen edad, educación, ingresos, seguro de salud y tipo de instalación de atención médica utilizada.

Conclusiones: el estudio proporciona información valiosa sobre la percepción de desigualdad asociada con el acceso a sistemas de salud en América Latina, una de las regiones más desiguales del mundo. Las políticas públicas que aborden este problema influirían positivamente en la calidad de vida objetiva y subjetiva de los latinoamericanos. Sin embargo, se necesita más consenso sobre indicadores adecuados para medir el acceso a la salud, y se necesitan más estudios que analicen el acceso a los servicios de salud durante la pandemia y la percepción de los usuarios.

Palabras clave: América Latina; Accesibilidad a Servicios de Salud; Desigualdad Social.

INTRODUCTION

Inequality in access to healthcare is a major issue in both developing and developed countries that affects people's health and well-being. Policymakers have sought to understand the attitudes, behaviors, and preferences of individuals regarding the rise of inequality to predict the consequences of policies related to inequality.[1] However, to address health inequities effectively, social science research needs to distinguish adequately between the types of inequality people perceive.[2]

Latin America is known for its income and wealth inequality, where cities' physical and social environments, lack of public health and healthcare infrastructure, and significant social and health inequities make these nations particularly vulnerable to COVID-19.[3,4] Therefore, the perception of inequality in health services during the SARS-COV-2 pandemic has become a fundamental aspect to consider in formulating public policies in this sector.

The COVID-19 pandemic had a severe impact on the global economy and demonstrated that medical facilities worldwide were unprepared for the challenges associated with growing patient numbers, shortages of protective equipment, and insufficient medical staff. Despite governments' efforts to counter the pandemic's impact, the implemented measures have not always been sufficient to maintain access to quality health services.[5,6]

Health inequality remains a major challenge globally, with disparities in access to health services, health outcomes, and health-related behaviors. The COVID-19 pandemic has brought to the forefront the inequities that exist in healthcare systems, particularly in vulnerable populations. Moreover, perceptions of inequality in healthcare have been linked to overall health status and well-being. As such, understanding the factors that contribute to the perception of inequality in healthcare is crucial for policymakers and healthcare providers to address health inequities effectively.

Therefore, this study aims to answer: What factors determine the association between the perception of inequality and access to health services in Latin America in 2020? The study uses data from the 2020 Latinobarómetro and focuses on socio-demographic, perception, and access to health services factors.[7] To achieve this, three supervised learning algorithms were used: logit regression with Lasso regularization algorithm, decision tree, and random forests.

This paper seeks to address the gap in the literature on the perception of inequality in healthcare systems, particularly in vulnerable populations. The study is essential as it provides valuable insights into the perception of inequality associated with access to health systems in one of the world's most unequal regions. The article highlights the need for more consensus on the appropriate indicators for measuring access to health, as public policies based on diagnostics and quantitative indicators may fail to consider subjective factors related to individuals. Furthermore, the article emphasizes the importance of patient satisfaction in programs aimed at improving the quality and outcomes of health services.

The perception of inequality in healthcare varies among individuals and depends on health metrics, political attitudes, and social well-being. However, there has yet to be a consensus in the scientific community on measuring these perceptions.

Jachimowicz et al.[8] provide a frame of reference for this subject; these authors postulated that it is necessary to contextualize the following aspects: (1) the type of inequality to which the individual is exposed; (2) the level of analysis, i.e., whether it is between their community, country, or nation; (3) since each individual has different conceptualizations of inequality, the distribution of resources captures different attributes; and (4) the reference group against which individuals evaluate inequality, which should be conducted on age, gender, and race, among others.

One of the significant challenges for public policy is to reduce health inequality, as there is evidence of a relationship between health and welfare policies. Although debates on causality between social and health inequalities exist, there is a correlation between inequalities in social determinants of health and health inequalities.[9]

Patient satisfaction with healthcare plays a fundamental role in programs aimed at improving the quality and outcomes of health services.[10] Providing quality access to users is one of the objectives of health systems in Latin America. Therefore, public policies addressing this issue would positively influence Latin Americans'

objective and subjective quality of life.

There is a need for more consensus on the appropriate indicators for measuring access to health, which led to debates. One approach could be patient satisfaction, which is widely collected but requires adequate monitoring.[11] Public policies based on diagnostics and quantitative indicators may sometimes fail to consider subjective factors related to individuals.[12,13,14]

Health status, quality, and access to health services' impact on well-being is essential. However, more studies analyzing access to health services during the pandemic and users' perception are necessary. Components of patient satisfaction and perception include the quality of care, equity in accessibility, a participatory approach to care and prevention, reasonable costs, and an affordable health insurance system.[15]

In Latin America, health self-assessment indicators correlate with individuals' health and economic conditions, with those with lower incomes recognizing more health problems.[16]

METHODS
Data

The data are from the 2020 Latinobarómetro[7], a public opinion study that conducted 18,765 interviews with inhabitants from 18 Latin American countries. The study's universe comprised the populations of Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

The framework used for this research was proposed by Jachimowicz et al[8]. The variables were based on four questions:

- What type of inequality? In this study, we analyzed inequality related to access to health services, and we chose the dependent variable "Target" based on this criterion.
- What level of analysis? We defined the level of analysis based on the country in which the individual lived at the time of the survey, since the "Target" variable refers to how the individual perceived inequality in their nation of residence.
- Which part of the distribution? We used each individual's perception of access to health systems as the variable to measure inequality.
- Which comparison group? As predictors, we included factors such as age, gender, country of residence, and self-location. This allowed us to control for all the factors that could affect the perception of inequality in different population segments.

The dependent variable considered was the respondents' response to the question: "Is the worst expression of inequality in the country access to health services?" (Q75NPN_02). This variable takes the value of one for individuals who answered yes and zero otherwise. The explanatory variables were the socio-demographic and perception-related factors listed in Table 1.

Table 1. Notation and independent variables			
Variable class	**Notation**	**Variable/Variable**	**Categories defined for non-continuous variables**
Perception	P41N	Is which the country's capacity to combat the pandemic?	1. Very good 2. Good 3. Regulate 4. Bad 5. Very bad 8. I do not know 0. Does not answer
	P19N.B	How fair is access to education?	1. Very fair 2. Fair 3. Unfair 4. Very unfair 8. I do not know 0. Does not answer
	S6NPN_05	Should the government help the poorest by giving them access to education?	1. Yes 0. No
	p12st	Do a few powerful groups rule country for its benefit, or is it governed for the good of all the people?	1. Powerful groups on their own 0. For the good of all the people

	P1ST	Degree of satisfaction with life	1.Very satisfied 2.Quite satisfied 3.No very satisfied 4.Not at all satisfied 8.Does not answer
	P11STGBS	Satisfaction with democracy	1.Very satisfied 2.Quite satisfied 3.No very satisfied 4.Not at all satisfied 8.Does not answer
	P15N.J	Trust in public hospitals to improve quality of life.	1.A lot 2.Something 3.Little 4.None
	P15N_K	Reliance on private clinics to improve quality of life	1.A lot 2.Something 3.Little 4.None
	P75NPN_01	The worst expression of inequality in the country is educational opportunities.	1.Yes 0.No
	P75NPN_03	His country's worst expression of inequality is access to drinking water and energy services.	1.Yes 0.No
	P47ST_K	To what extent is social security guaranteed in the country?	1.Fully guaranteed 2.Somewhat guaranteed 3.Poorly guaranteed 4.Not at all guaranteed 8.No know the no response
	P71STM	Do you think the President and his officials are involved in acts of corruption?	1.Yes 0.No
	S3	Worry about losing the job within the next twelve months	1.Very worried 2.Worried 3.Litle worried 4.No is worried 5.Do not have a job (unemployed, students, ho-memakers, retirees) 0.No knows the no answers
	S6NPN	How do you think the government should help the poorest by giving them?	1.Money 2.Food 3.Work 4.Housing 5.Access to education and Health 6.Access to utilities (energy, wa-ter, and sanitation) 7.Access to internet services 8.Access to transport services 0.NS
Self-Ubication	P18ST	Political scale ("0" is the "left" and "10" is the "right"). Where would it be located?	
	P8ST_A	Self-location on the poverty-wealth scale ("1" are the poorest people and in the "10" are the "richest" people)	
	P57ST	Do you think that part of a discriminated group?	1.Yes 0.No
	S1	Subjective social class	1.High 2.Medium High 3.Medium 4.Medium Low 5.Low 8.No know the no response 0.No answer

	P59ST.B	Willingness to go out and march and protest for improved health and education (very disposed "10", unwilling "1")	
Demographic	IDENPA	Country in which it lives	
	AGE	Age	
	S16	Level of education	
	S24_A	Current occupational situation	1.Independent/own account 2.Employee in a public undertaking 3.Employee in private enterprise 4.Temporarily does not work 5.Retired/retired 6.No works/responsible for shopping and home care 7.Student
	SEX	Sex	1.Man 0.Woman
	S4	The salary or salary and total family income:	1.It reaches them well. They can save 2.It reaches them somewhat without great difficulties 3.No it reaches them; they have difficulties 4.No it reaches them; they have great difficulties 8.I do not know 0.No answer
Source: Own elaboration.			

Algorithms

According to Belloni et al.[17], the estimator for a logit model with the LASSO regularization algorithm is:

$$\lambda \text{logit} = \frac{d\alpha^{-1}}{2\sqrt{N}}\{1 - \frac{1,1}{2\max\{n, p\ln N\}}\}$$

For the decision trees, the classification is done by taking a measure of global impurity, which uses the Gini or entropy index. According to James et al.[18], these indices are defined as:

$$\text{Gini index} = \sum_{n=1}^{n} pmn * (1 - pmn)$$

Where n is the class number, the Gini index measures node purity.

$$\text{Crossentropy index} = \sum_{n=1}^{n} pmn * \log pmn$$

The crossentropy has a small value if the node is pure.

The Random Forest model averages the predictions of many individual trees. This algorithm uses bootstrap aggregation, to reduce overfitting and improve accuracy.[19]

RESULTS

In this study, we used the machine learning module provided by Stata 17[20] for estimation. We employed three supervised learning algorithms: logit regression with Lasso regularization, decision tree, and random forests. The sample was divided into two parts, with 80 % for training and 20 % for model validation. We compared the models using the Receiver Operating Characteristic (ROC) threshold.

As mentioned above, we employed three supervised learning algorithms, and the logit model with Lasso regularization algorithm identified 57 significant covariates out of the 130 answers provided by the interviewees (Table 2). Moreover, this model identified the variables that had the most significant impact on individuals' probability of considering access to health services as the most significant expression of inequality in their country. These variables were associated with people's perception of inequity in access to drinking water,

energy services, poverty, and educational opportunities.

Furthermore, the algorithm found that Chileans were more likely to consider access to health services as a significant expression of inequality, followed by Colombians and Brazilians. Conversely, Uruguayans had a lower probability of associating inequality with access to health services. It should be noted that Uruguay and Chile have the highest per capita expenditure on health in Latin America and the Caribbean, but the algorithm's findings were contrary to expectations.

Table 2. Results Logit Model with Lasso Regularization Algorithm	
COVARIABLES	COEF
P75NPN_01	0,6302284
P75NPN_03	0,435241
Chile	0,2947316
s6npn_05	-0,2127297
p15n_j_2	-0,171206
Uruguay	-0,1623227
Colombia	0,1036446
Brasil	0,0955332
p19n_b_2	-0,0786377
Panamá	-0,0740261
Nicaragua	-0,0654042
p59st_b_10	0,0649475
s4_1	-0,0504043
s16	-0,0504034
WITHOUT STUDIES	
p19n_b_1	-0,0473413
P71STM_01	-0,0457956
p18st_8	-0,0457322
age	0,0457186
Costa Rica	-0,0453371
_cons	0,0445688
Venezuela	0,0388826
p59st_b_6	-0,0364821
p15n_k_2	0,0359757
p18st_7	-0,0340522
p47st_k_1	-0,031717
p1st_3	0,0310842
P8ST_A_1	-0,0304287
s3_1	0,028614
p18st_left	0,0280312
s16_7years	0,027275
p59st_b_5	-0,0263794
Rep, Dominicana	-0.0221939
p41n_3	0,0159497
s4_3	0,0157653
Bolivia	0,0148847
p15n_k_4	-0,0146237
p59st_b_9	0,0130939

s3_2	-0,0130409
P11STGBS_A_1	-0,0116767
p59st_b_3	0,0113967
p41n_2	-0,0099622
p47st_k_4	0,0089563
p18st_2	0,0069579
p59st_b_2	0,0068283
p59st_b_4	-0,0065848
s16_10years	-0,0050638
s16_8years	-0,0049207
s3_4	0,0028106
p47st_k_2	-0,0012668
p59st_b_1	-0,0006746
p8st_a_5	0,0006738
p18st_3	-0,0006526
p18st_RIGHT	-0,0003335
Ecuador	-0,0002566
SALARIATE IN PRIVATE_EMPLOYMENT	-0,0001449
Argentina	-0,0000633

Source: Own elaboration[20]

Other interesting findings are that individuals with higher incomes, higher levels of education, access to social protection, right-wing political orientation, and greater trust in institutions and their rulers were less likely to believe that access to health was an issue of inequality.

Individuals with greater job instability, leftist political orientation, a negative perception of how the pandemic was handled, a negative perception of corruption, and fewer years of schooling were more likely to consider access to health services as a significant expression of inequality in their country.
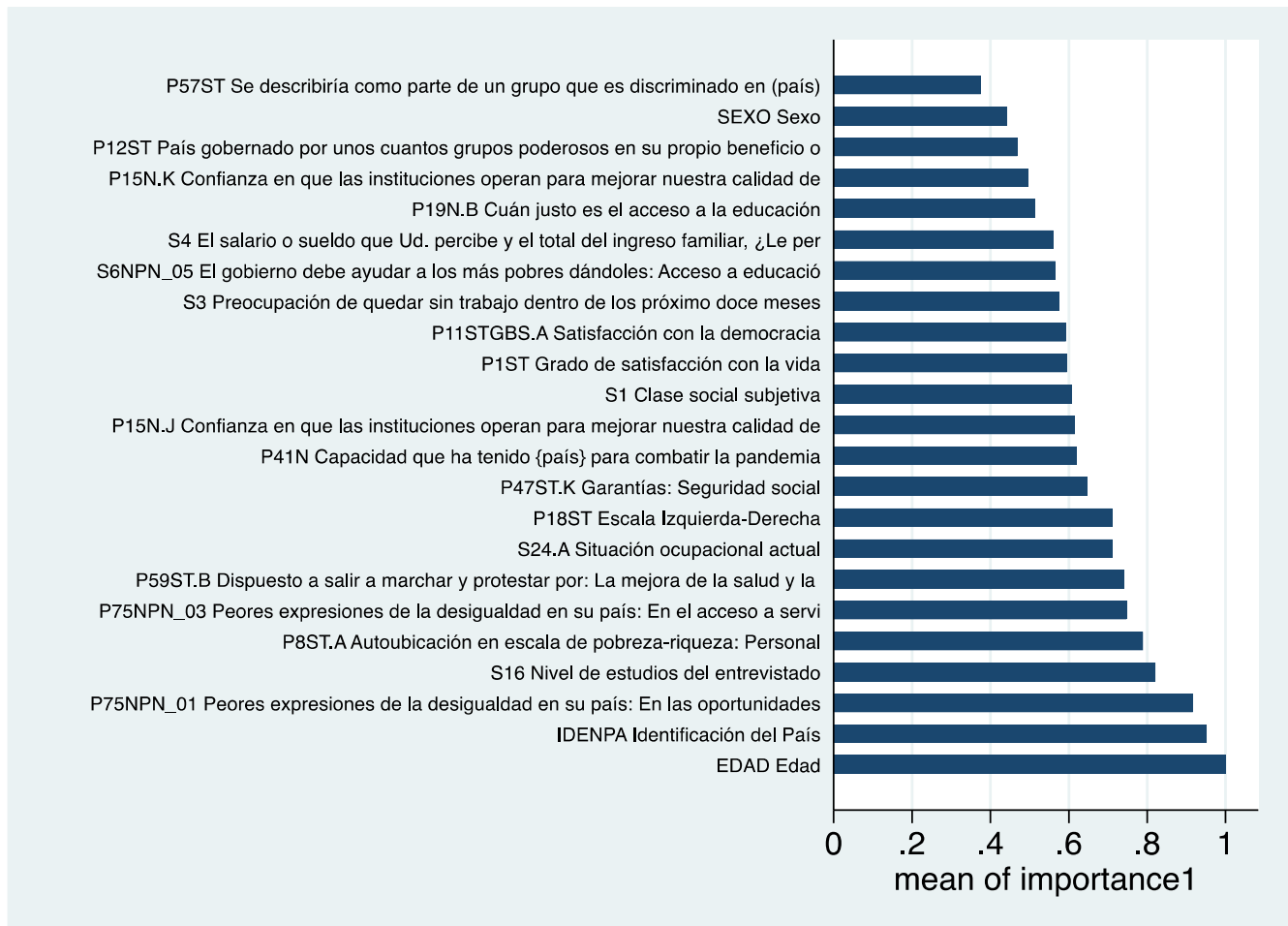
The decision tree corroborated the above results, estimating 1,561 nodes. In those nodes where the class to predict was the consideration of access to health services as the most significant expression of inequality, the primary predictors were access to primary and health services, education, and country of residence. On the other hand, the random forests model, trained with 20 trees and with a depth of 10 levels each, showed in the importance matrix (Figure 1) that the variables that most influenced the prediction that the individual considered access to health services as the most significant expression of inequality in their country were (i) their age, (ii) country of residence, (iii) the individual's perception of the inequality in access to education, (iv) the level of schooling, and (v) self-location on the poverty scale. This model showed that older individuals, those with lower levels of education, and those who perceived subjective poverty had a higher probability of considering access to health services as a significant expression of inequality.

As mentioned above, we used three supervised learning algorithms and compared them using ROC (Receiver Operating Characteristic) thresholds. In all cases, we established that discriminatory precision was good, so the estimates can correctly classify individuals who considered that the worst expression of inequality in their country is access to health services (Table 3).

Table 3. ROC Coefficients of Algorithms Used		
Algorithms	*Training sample*	*Validation sample*
Logit regression with lasso regularization algorithm	07925	0,7924
Decision tree	0,7390	0,7143
Random forests	0,7495	0,6906

Source: Own elaboration[20]

Figure 1. Importance Matrix of Random Forests

Source: Own elaboration[20]

DISCUSSION

Given that Latin America is one of the regions with the most significant inequality in the world and there have been social protests that include improvements in the health system, understanding the perception of individuals about access to health services and inequality in times of COVID-19 is fundamental for the state. The findings of this research show that in Latin America, significant predictors of the perception of individuals that access to health services is the worst expression of inequality were associated with: (i) income level, (ii) assessments of inequity in access to education and essential services, (iii) country of residence, and (iv) sociodemographic profile.

This study showed that the model proposed by Jachimowicz et al.[8] was a valuable tool for understanding the factors that influence perceptions of inequality associated with access to health systems. These authors propose four aspects to understand economic inequality: type, level, distribution, and comparison group. The algorithms showed that the predictors were associated with the perception of inequality (access to health, education, or public services). In addition, the logit model showed that this perception was associated with how respondents thought the state should help overcome poverty, in this case, access to health services. Comparison groups contributed to the analysis as factors such as country of residence and self-location affected perceptions of inequality in different population segments.

This study found that the most economically vulnerable people, due to job instability, low levels of education, and a poor perception of institutions and government, were more likely to consider access to health as an essential expression of inequality. On the other hand, in people with a better socioeconomic status, the probability of the previous consideration decreased.

The above results are consistent with several authors who explain the impact of socioeconomic factors on health inequality, including material aspects, psychosocial mechanisms, differences in health-related behavior, and access to medical care. This study explains why individuals present differences in health associated with their socioeconomic conditions in Latin America, leading to a significant concentration of poor self-perceived health among poorer individuals; this study corroborated planted.[21]

Furthermore, this research confirms that complex interactions between genetics and the social determinants of health, including the physical environment and social and economic conditions, determine human health. A key element is income distribution for early mortality and lower life expectancy, as it determines where the individual lives, the quality of education, the availability of healthy foods, and access to health care.[22]

The logic of private insurance can explain the results found for Chile. This logic caused the segregation of the population by the ability to pay and its risk of contracting diseases. The public health subsystem of Chile generated the naturalization of mercantile forms of operation. These forms focused on the generation of niches of capital accumulation from the population's health needs.[23,24]

This research found that people in Colombia were most likely to perceive that the most significant expression of inequality was access to health services. The type of affiliation to the General Social Security System in Health had become an indicator that shows the socioeconomic level, finding more significant morbidity and premature mortality generated by the social determinants of health.[25]

The results for Brazil were similar to those for Colombia and Chile. Brazil's unified care system currently identifies essential health inequalities since the most vulnerable population has difficulty using protection, recovery, and health promotion programs.[26]

As mentioned above, although Chile and Uruguay have the highest per capita health expenditures in Latin America, Chileans consider access to health services as the main expression of inequality in their country, while this is not the case in Uruguay. This result for Uruguay is consistent with the Comprehensive Health Care Model, which emphasizes the participation of inhabitants in the health generation process and manages resources more efficiently, ensuring equitable and quality health care.[27]

CONCLUSION

Healthcare inequality remains a significant challenge worldwide, and the COVID-19 pandemic has exposed these disparities. Latin America is particularly vulnerable due to its physical and social environment, lack of public health infrastructure, and significant social and health inequalities. To address health inequalities, social science research must distinguish adequately between the types of inequality people perceive. The current study aimed to understand the factors determining the association between the perception of inequality and access to health services in Latin America in 2020 using data from the 2020 Latinobarómetro.

Patient satisfaction with healthcare plays a fundamental role in programs aimed at improving the quality and outcomes of health services. Therefore, public policies addressing this issue would positively influence Latin Americans' objective and subjective quality of life. Further studies analyzing access to health services during the pandemic and users' perception are necessary. Components of patient satisfaction and perception include the quality of care, equity in accessibility, a participatory approach to care and prevention, reasonable costs, and an affordable health insurance system.

In summary, policymakers and healthcare providers need to understand the factors that contribute to the perception of inequality in healthcare to address health inequities effectively. Future studies should explore the link between social determinants of health and health inequalities and evaluate public policies that aim to reduce these disparities. Additionally, patient satisfaction and perception should be considered when developing policies related to healthcare. Finally, research should explore how Latin American governments can provide affordable and equitable access to quality health services.

REFERENCES

1. Premachandra B, Lewis Jr NA. Do we report the information that is necessary to give psychology away? A scoping review of the psychological intervention literature 2000–2018. Perspect Psychol Sci. 2022;17(1):226-238. https://doi.org/10.1177/1745691621990665.

2. Stantcheva S. Understanding tax policy: How do people reason? Q J Econ. 2021;136(4):2309-2369. https://doi.org/10.1093/qje/qjab033.

3. Diez Roux AV, Barrientos-Gutierrez T, Caiaffa WT, Miranda JJ, Rodriguez D, Sarmiento OL, et al. Urban health and health equity in Latin American cities: what COVID-19 is teaching us. Cities Health. 2021;5(sup1):S140-S144. https://doi.org/10.1080/23748834.2020.1809788.

4. Ramírez Lozano JP, Bridshaw Araya LC, Brito Ochoa MP. Latin American female academic perceptions about the COVID pandemic's impact on gender equity and within-country inequality. Manag Res J Iberoam Acad Manag. 2022;20(2):169-192. https://doi.org/10.1108/MRJIAM-10-2021-1242.

5. Tuczyńska M, Matthews-Kozanecka M, Baum E. Accessibility to non-COVID health services in the world during the COVID-19 pandemic. Front Public Health. 2021;9:760795. https://doi.org/10.3389/fpubh.2021.760795.

6. Vázquez ML, Vargas I, Oliver A, Espinel V, Ronda E, Sanz-Barbero B, et al. Access to health services for non-Covid-19 causes during the pandemic. A literature review. Eur J Public Health. 2021;31(Supplement_3):ckab165-349. https://doi.org/10.1093/eurpub/ckab165.349.

7. Latinobarómetro Corporation. Chile. Corporación Latinobarómetro; 2021. https://www.latinobarometro.org/latContents.jsp.

8. Jachimowicz JM, Davidai S, Goya-Tocchetto D, Szaszi B, Day MV, Tepper SJ, Phillips LT, Mirza MU, Ordabayeva N, Hauser OP. Inequality in researchers' minds: Four guiding questions for studying subjective perceptions of economic inequality. J Econ Surveys. 2022;1-20. https://doi.org/10.1111/joes.12507.

9. Kelly-Irving M, Ball WP, Bambra C, Delpierre C, Dundas R, Lynch J, McCartney G, Smith K. Falling down the rabbit hole? Methodological, conceptual and policy issues in current health inequalities research. Crit Public Health. 2022;1-11. https://doi.org/10.1080/09581596.2022.2036701.

10. Pérez RA, Tejada CAO, Triaca LM, Bertoldi AD, dos Santos AMA. Socioeconomic inequality in health in older adults in Brazil. Dialogues Health. 2022;1:100009. https://doi.org/10.1016/j.dihel.2022.100009.

11. Mpinga EK, Chastonay P. Satisfaction of patients: a right to health indicator? Health Policy. 2011;100(2-3):144-150. https://doi.org/10.1016/j.healthpol.2010.08.020.

12. Hu S, Das D. Quality of life among older adults in China and India: Does productive engagement help? Soc Sci Med. 2019;229:144-153. https://doi.org/10.1016/j.socscimed.2018.

13. McNamee P, Mendolia S. Changes in health-related quality of life: a compensating income variation approach. Appl Econ. 2019;51(6):639-650. https://doi.org/10.1080/00036846.2018.1504160.

14. Skevington SM, Böhnke JR. How is subjective well-being related to quality of life? Do we need two concepts and both measures? Soc Sci Med. 2018;206:22-30. https://doi.org/10.1016/j.socscimed.2018.04.010.

15. Vuković M, Gvozdenović BS, Gajić T, Gajić BS, Jakovljević M, McCormick BP. Validation of a patient satisfaction questionnaire in primary health care. Public Health. 2012;126(8):710-718. https://doi.org/10.1016/j.puhe.2012.03.008.

16. Bilal U, Hessel P, Perez-Ferrer C, Michael YL, Alfaro T, Tenorio-Mucha J, et al. Life expectancy and mortality in 363 cities of Latin America. Nat Med. 2021;27:463-470. https://doi.org/10.1038/s41591-020-01231-8

17. Belloni A, Chernozhukov V, Wei Y. Post-selection inference for generalized linear models with many controls. J Bus Econ Stat. 2016;34:606–619. https://doi.org/10.1080/07350015.2016.116

18. James G, Witten D, Hastie T, Tibshirani R. An introduction to statistical learning. Springer; 2013.

19. Zhang Mengmeng, Liu Yi'an, Song Ping. Applications of partial connection clustering algorithm and random forest algorithm in radar signal sorting. Laser Optoelectron Prog. 2019;56(6):062804. https://doi.org/10.3788/LOP56.062804.

20. Stata Statistical Software. Release 17. StataCorp LLC; 2021.

21. Pérez-Romero S, Gascón-Cánovas JJ, Salmerón-Martínez D, Parra-Hidalgo P, Monteagudo-Piqueras O. Sociodemographic characteristics and geographical variability related to patient satisfaction in Primary Care. J Care Qual. 2016;31(5):300-308. https://doi.org/10.1097/JCQ.0000000000000157.

22. Olden K. The Inaugural Olden Distinguished Lecture: economic inequality and health disparities. Environ Health Perspect. 2021;129(4):041001.

23. Goyenechea M. Subsidiary status, segmentation and inequality in the Chilean health system. Cuad Méd Soc. 2019;59(2):7-12.

24. Fuentes-García A. The cry of inequities: Social explosion and health in Chile. Rev Chil Salud Pública. 2019;23(2):93-94. https://doi.org/10.5354/0719-5281.2019.53715

25. Hilarión-Gaitán L, Díaz-Jiménez D, Cotes-Cantillo K, Castañeda-Orjuela C. Health inequalities according to affiliation regime and events notified to the Surveillance System (Sivigila) in Colombia, 2015. Biomedica. 2019;39(4):737-747. https://doi.org/10.7705/biomedica.4453

26. Almeida-Filho ND. Health inequalities: new theoretical perspectives. Collective Health. 2020;16:e2751. https://doi.org/10.1590/1414-462x202000010275

27. Alves ADL, Santos RD. Social protection: outlining considerations about the system of neighboring Uruguay. Serviço Social & Sociedade. 2021;142:264-284. http://doi.org/10.1590/0101-6628.052

CONFLICT OF INTEREST
The authors indicate that they have no conflict of interest in the preparation of this article.

AUTHORSHIP CONTRIBUTIONS
Conceptualization: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Data curation: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Formal analysis: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Funding acquisition: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Investigation: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Methodology: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Project administration: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Resources: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Software: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Supervision: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Validation: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Visualization: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Writing - original draft: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.
Writing - review and editing: Carolina Henao, Jenny Paola Lis-Gutiérrez, Melissa Lis-Gutiérrez.