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Impact of the COVID-19 pandemic on primary care for individuals with autism spectrum disorder in the Peruvian health system: A time series analysis

David Villarreal-Zegarra
Scientific University of the South
Jhan Franco Tejada-Flores
Instituto Peruano de Orientación Psicológica
Max Pariona Cárdenas
Superintendencia Nacional de Salud
Luciana Bellido-Boza
lubellido@gmail.com

Peruvian University of Applied Sciences

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Abstract

Background

The COVID-19 pandemic disrupted health service delivery in low- and middle-income countries such as Peru, potentially affecting primary care utilization among individuals with autism spectrum disorder (ASD).

Objective

We assessed the impact of the pandemic on primary care utilization for individuals with ASD within two Peruvian health insurance systems.

Methods

We conducted a cross-sectional study using an interrupted time-series design with administrative data from the Comprehensive Health Insurance (Seguro Integral de Salud, SIS) and Health Service Providers (Entidades Prestadoras de Salud, EPS) from January 2016 to February 2024.

Results

We included 211,879 SIS-financed users and 3,391 EPS-financed users. In SIS, the pre-pandemic trend increased by 26.7 unique users per month ($p < 0.001$). At the onset of the pandemic, utilization decreased abruptly (-1,286.4; $p < 0.001$), followed by a sustained increase during the pandemic (114.9 users per month; $p < 0.001$). After October 2022, utilization continued to increase and exceeded pre-pandemic levels (103.9 users per month; $p < 0.001$). In EPS, utilization increased before the pandemic, declined at its onset, and increased during and after the pandemic.

Conclusions

The COVID-19 pandemic was associated with a sharp reduction in recorded primary care utilization for individuals with ASD in Peru, with a larger immediate impact in SIS. Subsequent recovery surpassed pre-pandemic levels, suggesting compensation for accumulated demand and vulnerability to system disruptions.

Background

In recent decades, an increase in the prevalence of autism spectrum disorder (ASD) has been reported (Maenner, 2023), potentially due to greater awareness of ASD diagnosis among parents and healthcare workers, as well as advances in diagnostic tools (Talantseva et al., 2023). Globally, it has been estimated that 100 out of every 10,000 children are diagnosed with ASD, based on assessments conducted in 34 countries (Zeidan et al., 2022). In 2020, ASD was identified in 278 out of every 10,000 children under the age of 8 years (Maenner, 2023), a higher figure compared to data from 2014, which reported 169 cases per 10,000 children across 11 surveillance sites in the United States (Zeidan et al., 2022). This increase has raised questions about the underlying causes, which have been primarily attributed to genetic and perinatal factors (Manoli & State, 2021). It is estimated that the risk of an

ASD diagnosis in a sibling of a child with ASD is up to 8.4 times higher compared to families without a history of ASD. In the case of childhood autism, this risk increases up to 17.4 times when there is an older diagnosed sibling (Hansen et al., 2019). Early identification plays a key role in the comprehensive management of ASD, as it significantly impacts the caregivers and family members who support the affected child.

The impact on caregivers of children with ASD who assume responsibility for treatment is multifaceted and varies according to the severity of the disorder and the country of residence. The economic costs associated with access to therapies and specialized medical care, as well as the amount of time devoted to patient care, can be substantial and may even result in catastrophic health expenditures (Cidav et al., 2012). The demand for resources required to treat a family member with ASD affects the socioeconomic situation of the household, as additional resources are needed. This often forces a family member or someone in the close social circle to leave their job to dedicate themselves to caregiving, or alternatively, to increase their income in order to hire a caregiver (Scherer et al., 2019). Furthermore, families of children with ASD often experience high levels of stress, anxiety, and feelings of isolation due to the emotional burden of caregiving (García et al., 2022). In addition, the emotional strain resulting from the financial demands of treatment and the social stigma associated with having a child with ASD can significantly affect caregivers' well-being, mental health, and family dynamics (Scherer et al., 2019).

High-income countries with robust healthcare systems exhibit higher rates of early detection of ASD cases. Moreover, an association has been identified between increases in the Human Development Index and improved access to early diagnosis and timely treatment for children with ASD (Talantseva et al., 2023). However, low- and middle-income countries (LMICs), such as Peru, which have limited healthcare budgets, show lower rates of early ASD diagnosis compared to high-income countries (Divan et al., 2021; Stewart & Lee, 2017). In particular, Peru has established specific policies for children and adolescents with ASD aimed at protecting them both individually and within their families (*Ley 30150*, 2014). Additionally, the country is implementing a national plan for individuals with ASD that seeks to enhance detection and promote social and occupational inclusion (Instituto Nacional de Salud del Niño de Breña, 2024). Despite these efforts, the Peruvian healthcare system continues to face challenges related to resource management and low awareness of the difficulties experienced by children with ASD and their families (Instituto Nacional de Salud del Niño de Breña, 2024). Furthermore, the COVID-19 pandemic in Peru severely disrupted the continuity of healthcare services (Villarreal-Zegarra et al., 2024) and restricted social mobility and access to social spaces for children and adolescents, including schools, parks, and therapy centers designed to support children with ASD (Teixeira et al., 2022).

Based on the above, this study aims to analyze the impact of the COVID-19 pandemic on the continuity of care for individuals with ASD in two Peruvian healthcare systems. The study underscores the urgent need to strengthen access to early diagnosis and specialized services to improve the prognosis and overall well-being of individuals with ASD and their families.

Methods

Study Design

This cross-sectional study evaluated the impact of the COVID-19 pandemic on primary health care for individuals with autism spectrum disorder (ASD) within the Peruvian health system. We applied an interrupted time-series analysis using administrative data from the Comprehensive Health Insurance (Seguro Integral de Salud, SIS) and

Health Service Providers (Entidades Prestadoras de Salud, EPS), covering the period from January 2016 to February 2024.

Setting

The Peruvian health system is characterized by a fragmented and segmented structure, comprising public and private subsystems that operate with varying levels of financing, coverage, and service capacity. In particular, the SIS primarily provides coverage to populations living in poverty and extreme poverty, whereas EPS mainly serves formally employed individuals with higher contributory capacity. Before the pandemic, access to specialized services for the care of neurodevelopmental disorders, including ASD, was limited, especially at the primary care level (Instituto Nacional de Salud del Niño de Breña, 2024).

The COVID-19 pandemic had a profound impact on the functioning of the Peruvian health system. Starting in March 2020, the government implemented lockdown measures, mobility restrictions, and redirected health services toward the care of COVID-19 cases. As a result, a substantial proportion of the system's human, logistical, and financial resources was prioritized for the emergency response. This resulted in a marked reduction in the availability and utilization of non-COVID-19 healthcare services, including outpatient consultations, screening activities, diagnostic evaluations, and follow-up care for chronic and neurodevelopmental conditions. During the pandemic period, access to primary care was significantly impacted by the temporary closure of health facilities, suspension of in-person consultations, reduced workforce availability, and widespread fear of infection among the population. These barriers disproportionately affected children, adolescents, and adults with ASD, who rely on periodic clinical assessments, early interventions, and specialized services for appropriate management of their condition. Although alternative modalities such as telehealth were implemented, their reach was limited due to gaps in connectivity, technological availability, and staff training, particularly within the public sector.

Participants

Participants included males and females aged 0 to 99 years who received care in Peru financed by SIS or EPS and had at least one diagnosis of ASD. We included valid ASD cases corresponding to any of the following four conditions: autistic disorder (F84.0), atypical autism (F84.1), childhood disintegrative disorder (F84.3), and Asperger syndrome (F84.5), according to the International Classification of Diseases, 10th revision (ICD-10). Although updated diagnostic criteria are available in ICD-11, many low- and middle-income countries continue to use ICD-10 guidelines.

Variables

Covariates

We included sociodemographic variables such as sex (male/female) and age in years (0–99 years).

Number of visits: This variable was defined as the number of unique individuals who attended per month with an ASD diagnosis provided by a qualified health professional (i.e., a physician). Participants were aggregated monthly based on the number of distinct individuals who attended during that month. If a participant received multiple visits within the same month, only one visit was counted, as it corresponded to the same user. Participants were also sub-grouped according to ASD diagnosis: childhood autism (F84.0), atypical autism (F84.1), other childhood disintegrative disorders (F84.3), and Asperger syndrome (F84.5).

me periods: We defined a temporal variable with three categories related to the COVID-19 pandemic: before the pandemic (51 months between January 2016 and February 2020), during the pandemic (31 months between March 2020 and September 2022), and after the pandemic (16 months between October 2022 and February 2024). The end of the pandemic period was defined as October 2022, when the Peruvian government declared the end of the COVID-19 state of emergency (Supreme Decree No. 130-2022-PCM).

Data Analysis

We performed a descriptive analysis of sociodemographic and clinical variables, reporting absolute and relative frequencies. To evaluate the impact of the pandemic on care for patients with ASD, we applied an interrupted time-series analysis, quantifying the monthly frequency of ASD diagnoses. We used segmented linear regression models with Newey–West robust standard errors to estimate changes in the level (intercept) and slope of the average monthly number of users attended and healthcare visits (Newey & West, 1987). Two interruption points were defined: March 2020, corresponding to the start of COVID-19 lockdown measures in Peru, and October 2022, corresponding to the partial reactivation of health services. The analysis period spanned from January 2016 to February 2024, with monthly time units and a statistical significance threshold of $p < 0.05$. Subgroup analyses were conducted according to diagnosis, sex, age, and type of health service. Cases with missing data were excluded, and autocorrelation was assessed using the Cumby–Huizinga (Breusch–Godfrey) test (Cumby & Huizinga, 1992).

Ethical Considerations

This study did not require ethical approval because the data were anonymized and obtained from secondary databases collected by the SIS and EPS health systems. The researchers had no direct contact with participants and no access to identifying information. The study adhered to the ethical principles established in the Declaration of Helsinki, ensuring data privacy and confidentiality (Carlson et al., 2004).

Results

Participant Characteristics

The sample consisted of users who received care at least once per month during the study period. A total of 3,391 users whose care was financed by EPS and 211,879 users whose care was financed by SIS were included (Table 1). Sex distribution differed by funding source. In the SIS, a higher proportion of care was provided to males (81.45%; n = 172,569), whereas in EPS, a higher proportion of care was provided to females (79.18%; n = 2,685). The age group with the highest number of unique users attended monthly was 4 to 6 years (SIS = 33.73%; EPS = 40.99%), followed by 7 to 9 years (SIS = 18.37%; EPS = 22.88%). Regarding specific diagnoses, most users were diagnosed with childhood autism (ICD-10 code F84.0; SIS = 83.37% and EPS = 83.90%), followed by Asperger syndrome (ICD-10 code F84.5; SIS = 8.51% and EPS = 10.94%).

Table 1
Number of unique monthly users served by each health subsystem.

	EPS (n = 3,391)		SIS (n = 211,879)	
	n	%	n	%
Sex				
Women	2685	79.18	39310	18.55
Men	706	20.82	172569	81.45
Age				
0–3	118	3.48	38479	18.16
4–6	1390	40.99	71473	33.73
7–9	776	22.88	38925	18.37
10–12	417	12.3	22823	10.77
13–17	368	10.85	22468	10.60
18–34	288	8.49	15276	7.21
35–64	31	0.91	2149	1.01
65 or more	3	0.09	286	0.13
ICD-10				
F840: Childhood Autism	2845	83.9	176633	83.37
F841: Atypical Autism	170	5.01	16403	7.74
F843: Other Childhood Disintegrative Disorder	5	0.15	811	0.38
F845: Asperger's Syndrome	371	10.94	18032	8.51
Pandemic				
Before the pandemic (51 months)	557	16.43	50478	23.82
During the pandemic (31 months)	826	24.36	52118	24.60
After the pandemic (16 months)	2008	59.22	109283	51.58
Note: Data are available from January 2016 to February 2024 for EPS and SIS.				

Interrupted Time-Series Analysis

In the SIS, the average monthly number of unique users with any ASD diagnosis at the start of the observation period (January 2016) was 329.1 (95% CI: 197.8-460.4), corresponding to the intercept. During the pre-pandemic period (February 2016 to February 2020), we observed a significant increase in the monthly number of unique users with an ASD diagnosis, with an average increase of 26.7 users per month (95% CI: 22.2 to 31.2; $p < 0.001$). The onset of the COVID-19 pandemic (March 2020) was associated with a significant reduction in the average number of unique users, with a decrease of 1,286.4 users (95% CI: -1,491.3 to -1,081.5; $p < 0.001$) compared with

the expected value in the absence of the pandemic. However, during the pandemic period (April 2020 to September 2022), we observed a sustained and significant increase in the average monthly number of unique users, with an increase of 114.9 users per month (95% CI: 70.9 to 158.9; $p < 0.001$). At the end of the pandemic period (October 2022), a non-significant decrease in the number of unique users with ASD was observed (-66.3; 95% CI: -400.8 to 268.2; $p = 0.699$). Finally, during the post-pandemic period (November 2022 to February 2024), the average monthly increase remained significant, with an increase of 103.9 unique users per month (95% CI: 55.3 to 152.5; $p < 0.001$) (see Fig. 1).

In the EPS, the average monthly number of unique users with any ASD diagnosis in January 2016 was 4.1 (95% CI: -0.6 to 8.8; $p = 0.093$). During the pre-pandemic period (February 2016 to February 2020), a significant increase in the monthly number of unique users was observed, with an average increase of 0.3 users per month (95% CI: 0.1 to 0.5; $p < 0.001$). At the onset of the pandemic (March 2020), a significant reduction in the average number of unique users was observed, with an estimated decrease of 13.3 users (95% CI: -21.1 to -5.5; $p < 0.001$) compared with the expected value based on the pre-pandemic trend. Subsequently, during the pandemic period (April 2020 to September 2022), the monthly number of unique users increased in a sustained and significant manner by 2.1 users per month (95% CI: 1.6 to 2.6; $p < 0.001$). Although a positive but non-significant change in the average monthly number of unique users with any ASD diagnosis was observed at the end of the pandemic period (October 2022; 6.5; 95% CI: -4.0 to 17.0; $p = 0.230$), a significant increase was observed during the post-pandemic period (November 2022 to February 2024), with an average increase of 8.7 unique users per month (95% CI: 7.1 to 10.3; $p < 0.001$) (see Fig. 2).

Changes in the monthly number of unique users by specific diagnosis, for both SIS and EPS, are presented in Table 2.

Table 2

Time-series analysis for neurodevelopmental disorders comprising Childhood Autism (F84.0), Atypical Autism (F84.1), Other Childhood Disintegrative Disorder (F84.3), and Asperger's Syndrome (F84.5).

		SIS			EPS		
		Estimate (CI95%)	**t value**	**p**	**Estimate (CI95%)**	**t value**	**p**
Overall	Intercept (January 2016)	329.1 (197.8 to 460.4)	4.9	< 0.001	4.1 (-0.6 to 8.8)	1.7	0.093
	Slope before the pandemic (February 2016 – February 2020)	26.7 (22.2 to 31.2)	11.7	< 0.001	0.3 (0.1 to 0.5)	3.4	< 0.001
	Change in slope at the beginning of the pandemic (March 2020)	-1286.4 (-1491.3 to -1081.5)	-12.3	< 0.001	-13.3 (-21.1 to -5.5)	-3.4	< 0.001
	Slope during the pandemic (April 2020 – September 2022)	114.9 (70.9 to 158.9)	5.1	< 0.001	2.1 (1.6 to 2.6)	7.6	< 0.001
	Change in slope at the end of the pandemic (October 2022)	-66.3 (-400.8 to 268.2)	-0.4	0.699	6.5 (-4.0 to 17.0)	1.2	0.230
	Slope after the pandemic (November 2022 – February 2024)	103.9 (55.3 to 152.5)	4.2	< 0.001	8.7 (7.1 to 10.3)	10.4	< 0.001
Childhood Autism (F84.0)	Intercept (January 2016)	270.6 (160.5 to 380.6)	4.8	< 0.001	2.7 (-1.8 to 7.1)	1.2	0.241
	Slope before the pandemic (February 2016 – February 2020)	21.1 (17.4 to 24.9)	11.0	< 0.001	0.2 (0.1 to 0.4)	3.1	0.002
	Change in slope at the beginning of the pandemic (March 2020)	-1053.7 (-1228.1 to -879.2)	-11.8	< 0.001	-9.5 (-16.7 to -2.3)	-2.6	0.012
	Slope during the pandemic (April 2020 – September 2022)	88.3 (56.0 to 120.7)	5.3	< 0.001	1.9 (1.4 to 2.5)	6.7	< 0.001
	Change in slope at the end of the	-44.0 (-324.2 to 236.2)	-0.3	0.759	2.8 (-7.4 to 13.0)	0.5	0.596

Note: Data from January 2016 to February 2024 are available for EPS and SIS. The overall autism spectrum disorder includes codes F84.0, F84.1, F84.3, and F84.5. In the case of code F84.3, we did not include SIS data in the analysis because the data did not converge.

		SIS			EPS		
		Estimate (CI95%)	**t value**	**p**	**Estimate (CI95%)**	**t value**	**p**
	pandemic (October 2022)						
	Slope after the pandemic (November 2022 – February 2024)	109.8 (73.0 to 146.5)	5.9	< 0.001	7.5 (5.7 to 9.3)	8.2	< 0.001
Atypical Autism (F84.1)	Intercept (January 2016)	24.2 (10.4 to 38.1)	3.4	< 0.001	1.5 (0.5 to 2.6)	2.9	0.006
	Slope before the pandemic (February 2016 – February 2020)	2.9 (2.4 to 3.4)	12.1	< 0.001	0.0 (0.0 to 0.0)	0.4	0.701
	Change in slope at the beginning of the pandemic (March 2020)	-135.4 (-157.8 to -113.0)	-11.8	< 0.001	-0.5 (-2.1 to 1.2)	-0.6	0.583
	Slope during the pandemic (April 2020 – September 2022)	10.0 (8.4 to 11.6)	12.4	< 0.001	0.1 (0.0 to 0.2)	1.7	NA
	Change in slope at the end of the pandemic (October 2022)	-44.3 (-75.3 to -13.3)	-2.8	0.006	-0.4 (-2.3 to 1.5)	-0.4	0.680
	Slope after the pandemic (November 2022 – February 2024)	-21.8 (-37.2 to -6.5)	-2.8	< 0.001	1.1 (0.0 to 2.2)	2.0	NA
Other Childhood Disintegrative Disorder (F84.3)	Intercept (January 2016)	3.6 (1.7 to 5.6)	3.7	< 0.001	-	-	-
	Slope before the pandemic (February 2016 – February 2020)	0.1 (0.0 to 0.2)	2.2	0.032	-	-	-
	Change in slope at the beginning of the pandemic (March 2020)	-7.9 (-11.7 to -4.0)	-4.0	< 0.001	-	-	-
	Slope during the pandemic (April 2020 – September 2022)	0.3 (0.1 to 0.4)	3.5	< 0.001	-	-	-

Note: Data from January 2016 to February 2024 are available for EPS and SIS. The overall autism spectrum disorder includes codes F84.0, F84.1, F84.3, and F84.5. In the case of code F84.3, we did not include SIS data in the analysis because the data did not converge.

		SIS			EPS		
		Estimate (CI95%)	**t value**	**p**	**Estimate (CI95%)**	**t value**	**p**
	Change in slope at the end of the pandemic (October 2022)	4.8 (1.2 to 8.3)	2.6	0.011	-	-	-
	Slope after the pandemic (November 2022 – February 2024)	-0.5 (-1.4 to 0.3)	-1.2	< 0.001	-	-	-
Asperger's Syndrome (F84.5)	Intercept (January 2016)	68.4 (45.6 to 91.1)	5.9	< 0.001	1.0 (-0.6 to 2.6)	1.2	0.224
	Slope before the pandemic (February 2016 – February 2020)	-0.3 (-2.1 to 1.4)	-0.4	0.708	0.0 (0.0 to 0.1)	1.2	0.253
	Change in slope at the beginning of the pandemic (March 2020)	-147.0 (-176.2 to -117.8)	-9.9	< 0.001	-1.0 (-3.4 to 1.4)	-0.8	0.433
	Slope during the pandemic (April 2020 – September 2022)	4.8 (2.7 to 6.9)	4.5	< 0.001	1.2 (0.9 to 1.5)	6.7	NA
	Change in slope at the end of the pandemic (October 2022)	-0.8 (-35.6 to 34.0)	0.0	0.965	-4.1 (-8.1 to -0.1)	-2.0	0.048
	Slope after the pandemic (November 2022 – February 2024)	10.4 (8.4 to 12.5)	9.9	< 0.001	-0.7 (-2.9 to 1.5)	-0.6	NA

Note: Data from January 2016 to February 2024 are available for EPS and SIS. The overall autism spectrum disorder includes codes F84.0, F84.1, F84.3, and F84.5. In the case of code F84.3, we did not include SIS data in the analysis because the data did not converge.

Discussion

Our study analyzes the impact of the COVID-19 pandemic on primary care for individuals with ASD within the Peruvian health system. Our findings show three main results. First, during the pre-pandemic period, we observed a sustained increase in the number of users diagnosed with ASD, consistent with the global trend of rising diagnoses reported in population-based studies from high- and middle-income countries. Second, the onset of the pandemic was associated with an abrupt and significant reduction in care for individuals with ASD, particularly pronounced within SIS. Third, following the pandemic, we observed a progressive recovery of services after the lifting of the state of emergency, with the recovery exceeding the average monthly number of unique users before the pandemic.

Before the pandemic, a sustained global increase in the number of ASD diagnoses had been reported, mainly attributed to improvements in detection, greater social awareness, and the expansion of diagnostic criteria (Talantseva et al., 2023). This suggests that, prior to the pandemic, the Peruvian health system followed a similar trajectory, with an increase in the number of ASD diagnoses, which is consistent with our findings showing an increase in care utilization before the pandemic. In addition, the enactment of Law No. 30150, which protects individuals with Autism Spectrum Disorder, and the implementation of the National Plan for Persons with Autism Spectrum Disorder may have contributed to improved detection and to the promotion of social and labor inclusion for individuals with ASD (Ministerio de Salud, 2014).

The abrupt reduction in healthcare utilization observed at the onset of the pandemic reflects the immediate impact of lockdown measures and the reorientation of the healthcare system toward responding to COVID-19 (Navarro Rubio et al., 2021). This finding is consistent with studies conducted in other low- and middle-income countries, which documented substantial declines in the utilization of maternal and child health services, mental health services, and care for chronic conditions during the first months of the pandemic (Ahmed et al., 2022; Roberton et al., 2020). In the case of ASD, disruptions in diagnostic evaluations, routine follow-up, and referrals to specialized services may have generated cumulative delays in identification and timely management, with potential long-term effects on development and functioning among affected individuals (McNally Keehn et al., 2021; Yeh et al., 2025).

Following the lifting of the public health emergency, we observed a progressive and sustained recovery of primary care services for individuals with ASD within the Peruvian health system. Moreover, the average monthly number of unique users exceeded levels observed during the pre-pandemic period, suggesting a compensatory effect associated with accumulated demand during months of stricter restrictions in Peru (Villarreal-Zegarra et al., 2023, 2024). This pattern has also been described in other international contexts, where the reactivation of non–COVID-19 health services was accompanied by increased utilization of services such as mental health care and care for non-communicable diseases (Huang et al., 2024; Miller et al., 2023).

The size of each health insurance system may explain the differences in the pandemic's impact between the SIS and EPS. The SIS is substantially larger than the EPS in Peru. However, both health insurance schemes exhibited very similar trajectories across the pre-pandemic, pandemic, and post-pandemic periods.

Our study is not exempt from limitations. First, although we used an interrupted time-series analysis, the design relies on aggregated data; therefore, inferential validity depends on strong assumptions, such as the stability of the pre-pandemic trend, seasonality, and autocorrelation. Second, a significant limitation is the reliance on administrative data from insurance systems (SIS/EPS), which reflect recorded utilization and clinical coding rather than population-level needs or the true prevalence of ASD. This may introduce measurement error due to changes in diagnostic practices, heterogeneity in ASD diagnostic methods, variations in professional availability, and data quality issues during the pandemic. Third, the expansion of remote modalities for ASD evaluation and follow-up during COVID-19 may have modified both demand and the way services were recorded, potentially generating discontinuities that do not necessarily correspond to actual "access reductions" in a strict sense. However, due to the lack of information on the modality of care (in-person or virtual), it was not possible to assess this source of bias. Fourth, we used diagnostic categories based on ICD-10 criteria, as these are implemented in the Peruvian health system. Although ICD-11 and DSM-5-TR criteria are currently available and considered the standard, they have not yet been implemented in this system (Bennett & Goodall, 2016). Finally, a strength of this study is that, as one of the first to evaluate the impact of COVID-19–related isolation on the provision of health services for

individuals with ASD in Peru, it establishes a foundation for future research. Additionally, the data are nationally representative and originate from two of Peru's most significant health insurance systems.

Conclusions

In this study, using an interrupted time-series analysis with administrative data from SIS and EPS (January 2016 to February 2024), we show that the onset of the COVID-19 pandemic (March 2020) was associated with an abrupt and significant reduction in recorded care for individuals with autism spectrum disorder (ASD), with a more pronounced impact within the SIS. After the lifting of the state of emergency (October 2022), we observed a progressive recovery in care utilization, reaching and exceeding pre-pandemic levels.

However, this recovery does not rule out the existence of accumulated gaps in timely diagnosis, treatment initiation, and continuity of care during the pandemic period, particularly among populations dependent on the public health system. In this context, our results indicate that the Peruvian health system is highly vulnerable to disruptions in the provision of ASD-related services, highlighting the importance of strengthening institutional resilience mechanisms. Overall, these findings suggest the need to implement specific strategies aimed at ensuring continuity of care for individuals with ASD during future crises, including strengthening primary care, improving health information systems, and promoting effective coordination across health subsystems. Furthermore, the adequate integration and systematic recording of remote care modalities may help reduce service disruptions and improve monitoring capacity. These results provide relevant evidence for the design of public policies aimed at improving early detection and continuity of care for individuals with ASD in Peru.

Declarations

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Availability of data and materials

The dataset is available on Figshare at https://doi.org/10.6084/m9.figshare.30969055.

Ethics approval and consent to participate

This study did not require ethical approval because the data were anonymized and obtained from secondary databases collected by the SIS and EPS health systems. The researchers had no direct contact with participants and no access to identifying information. The study adhered to the ethical principles established in the Declaration of Helsinki, ensuring data privacy and confidentiality.

Consent for publication

Not applicable.

Competing Interests

The authors have declared that no competing interests exist.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

Not applicable.

Authors' contributions

David Villarreal-Zegarra: Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing - original draft.

Jhan Franco Tejada-Flores: Investigation, Writing - original draft.

Max Pariona Cárdenas: Conceptualization, Data processing, Writing - review & editing.

Luciana Bellido-Boza: Investigation, Resources, Supervision, Writing - review & editing.

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Figures

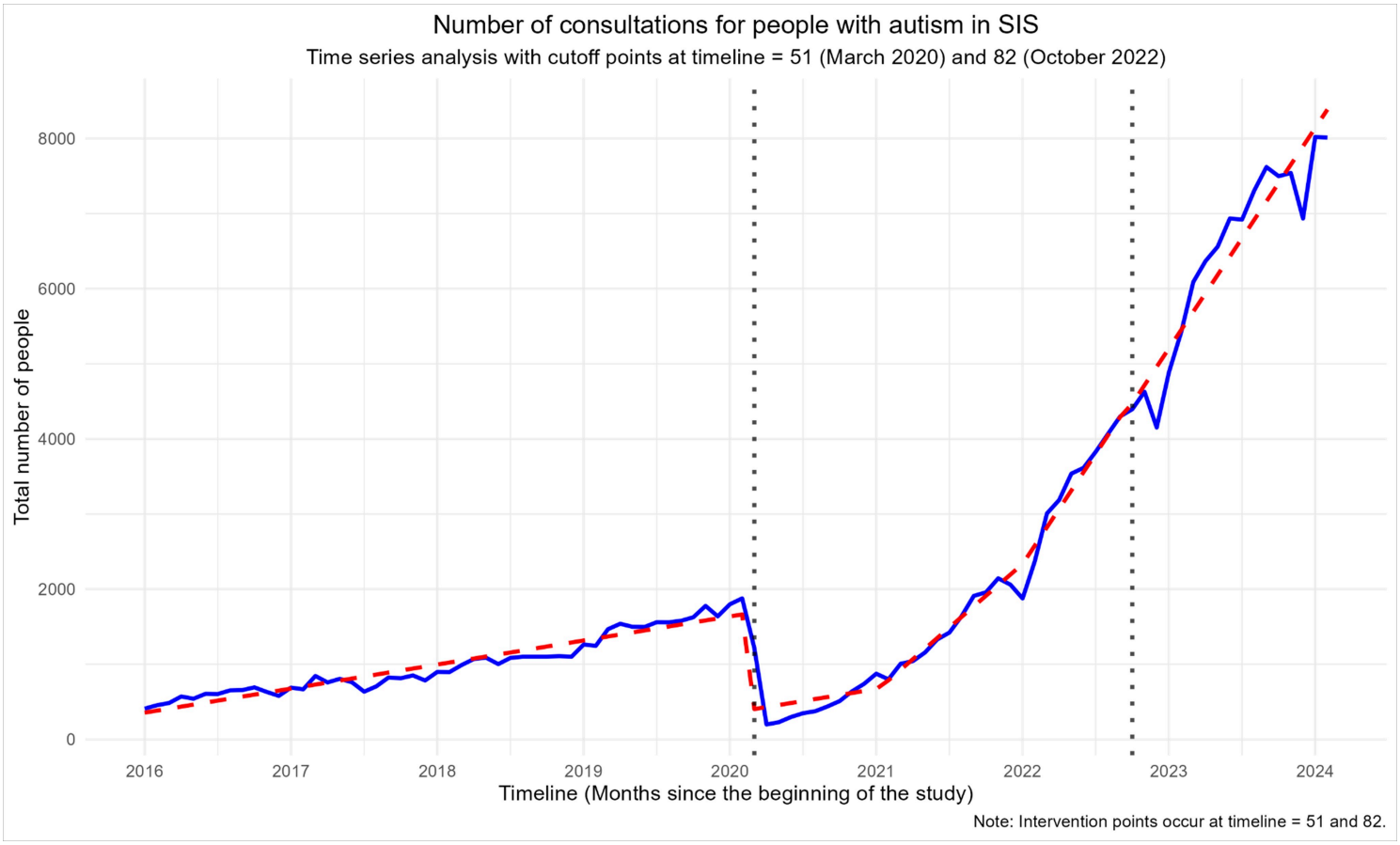


Figure 1

Time series analysis for SIS.

Note: Intervention points occur in March 2020 (timeline 51) and October 2022 (timeline 82). Information is available from January 2016 to February 2024.

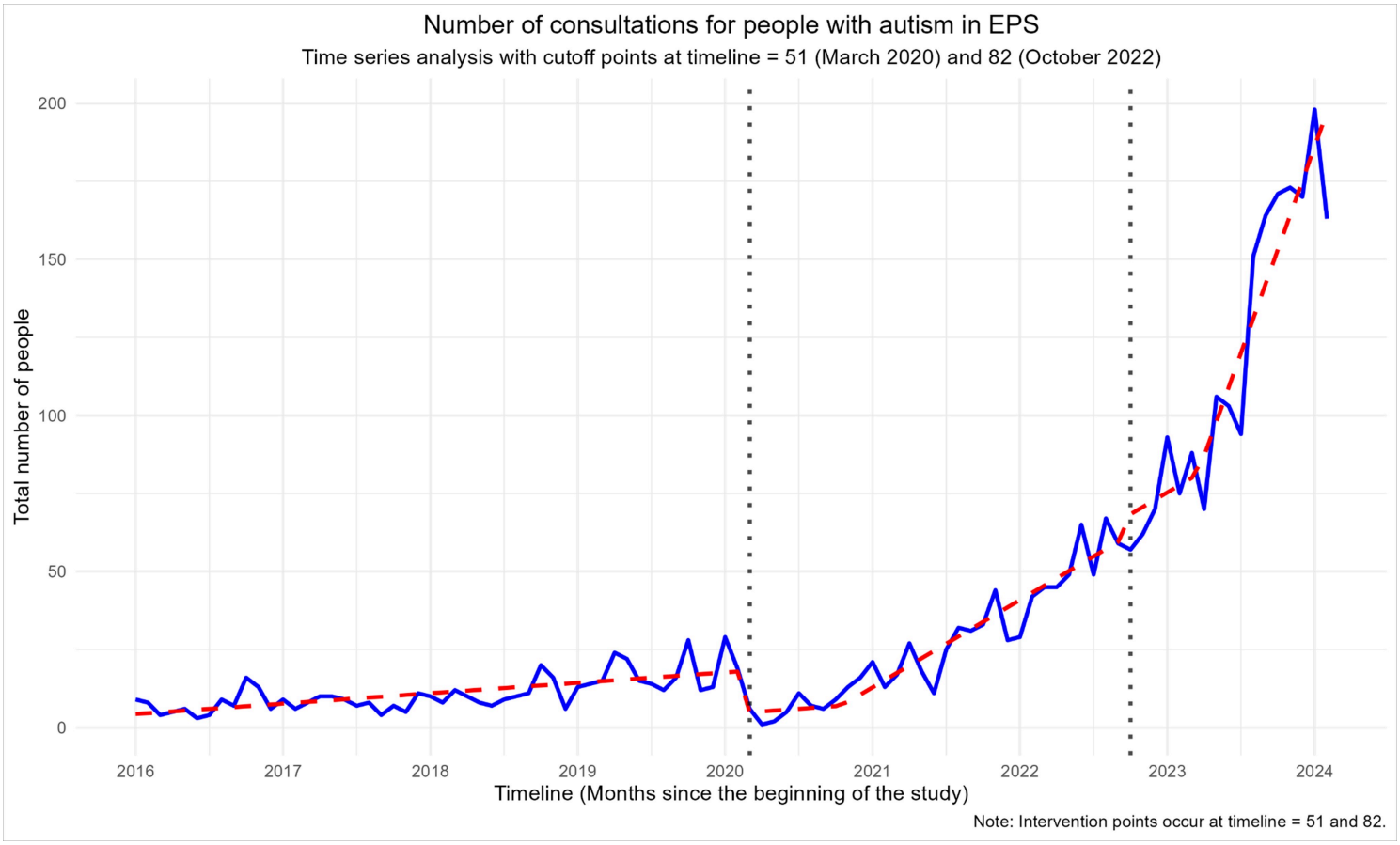


Figure 2

Time series analysis for EPS.

Note: Intervention points occur in March 2020 (timeline 51) and October 2022 (timeline 82). Information is available from January 2016 to February 2024.