

Health service utilization by people with psychosis during Peru's mental health reform and the COVID-19 pandemic: a population-based study

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Summary

Background Individuals with psychosis face persistent barriers to care. Peru's recent mental health reform expanded services nationwide but coincided with the COVID-19 pandemic. We hypothesized that service utilization among individuals with psychosis would increase between 2018 and 2024, particularly in underserved regions.

Methods We analyzed outpatient morbidity data from the Peruvian National Superintendence of Health (2018–2024). Sex was available as binary male/female coding; gender identity and race/ethnicity data were not available. Service utilization was compared across three groups: psychosis, non-psychotic mental disorders, and general medical conditions. We examined changes in access (rate ratios, rate differences), the impact of the pandemic (interrupted time series), and decentralization trends (Poisson regression), separately for each disorder group.

Findings In 2024 compared with 2018, monthly service utilization per 100,000 declined for psychosis (28.2 in 2018–19.2 in 2024; rate ratio 0.68), rose for non-psychotic mental disorders (225.2 in 2018–304.6 in 2024; 1.35), and slightly fell for general medical conditions (12,688.1 in 2018–12,370.4 in 2024; 0.97). The pandemic caused a comparable immediate drop in service utilization, with rates falling to 37.9%, 37.0%, and 35.3% of expected levels for the three groups in March 2020, followed by gradual monthly increases (psychosis 1.3%, non-psychotic mental disorders 2.6%, general medical conditions 2.2%). A shift from tertiary to primary and regional facilities was seen for both mental disorder groups, but greater utilization in underserved regions was observed only for non-psychotic mental disorders.

Interpretation Despite nationwide expansion of mental health services, individuals with psychosis did not experience higher service use. The pandemic's impact was acute and enduring for this group. Findings underscore the need to examine reasons for this stagnation in service utilization and evaluate the acceptability and appropriateness of Peru's current service model for psychosis.

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Introduction

In Latin America and the Caribbean, mental health systems struggle to address the needs for care of persons with psychosis, a serious mental health condition with onset typically in adolescence and early adulthood.¹

In this region, service coverage for psychosis, the proportion of people with psychosis who contact a health service, is 26.7%.² Therefore, many people remain untreated or inadequately treated, contributing to substantial burden.² Although many factors influence

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Research in context

Evidence before this study

Globally, people with psychotic disorders face major challenges in accessing mental health services. This limited access is particularly pronounced in Latin America and the Caribbean, where mental health systems are often underdeveloped, fragmented, and concentrated in large urban centers. To address this gap, several countries in the region, guided by the principles of the Caracas Declaration (1990), have sought to reorient mental health care toward community-based services. Peru, as part of this movement, launched a national mental health reform in 2012, establishing community mental health centers across the country—a process that coincided with the COVID-19 pandemic. We searched PubMed and SciELO for English- and Spanish-language studies published between January 1, 2010, and June 30, 2024, using combinations of the terms “psychosis,” “service utilization,” “mental health reform,” “COVID-19,” and “Latin America and the Caribbean.” Previous studies in the region have documented large treatment gaps for psychosis and limited access to community-based services. Some have described mental health reform experiences in Brazil and Chile; however, no population-level study has examined how service utilization among people with psychosis has evolved with the implementation of a mental health reform.

Added value of this study

This is the first national, population-level analysis of health service utilization among individuals with psychosis in Latin America in the context of a mental health reform. While focusing on psychotic disorders, the study also provides comparative data for non-psychotic mental disorders and general medical conditions, allowing for a broader understanding of how the reform differentially influenced

access to care across diagnostic groups. Using robust epidemiological methods, the study shows that despite the expansion of community mental health services and a shift toward primary care, service utilization for psychosis declined from 2018 to 2024, whereas access for non-psychotic disorders increased in the same period. Although the COVID-19 pandemic disrupted service use across all diagnostic groups, recovery was slower for psychosis. Additionally, both psychotic and non-psychotic disorders showed increased use of primary care services, but a substantial rise in service utilization in traditionally underserved areas was observed only for non-psychotic mental disorders.

Implications of all the available evidence

Taken together with previous regional and global evidence, these findings point to persistently low service utilization among individuals with psychotic disorders, reflecting barriers to detection, referral and engagement in care. Infrastructure expansion and decentralization alone may be insufficient to improve access to care for people with complex needs such as psychosis. Structural reforms should be complemented with strategies such as training personnel, streamlining pathways to care for early psychosis, and enhancing the acceptability and quality of community-based services. Targeted outreach and engagement, and culturally and contextually adapted models of care are needed to reach economically poor and rural populations where the treatment gap remains widest. Regarding research, longitudinal studies should examine how reforms affect the accessibility, quality and continuity of services, and the outcomes of psychosis. Comparative evaluations across countries implementing similar reforms could identify which service models and policy mechanisms most effectively reduce inequities in access to care.

service utilization (e.g., stigma, financial constraints),³ the limited availability of facilities is central in Latin America and the Caribbean, where care is mostly provided in psychiatric hospitals in large cities.⁴

Peru, an upper-middle income country from Latin America,⁵ has experienced such challenges. In Lima, the capital city where the country's three psychiatric hospitals are located,⁶ only 24.3% of people with mental disorders accessed services in 2002.⁷ Access was even lower outside Lima: 10.1% in rural areas of the capital region,⁸ 13.9% in the highlands and 14.3% in the jungle regions.^{9,10} In 2012, only 15.6% of people with psychosis in metropolitan Lima received care in the past 12 months.¹¹ In this context of low service coverage, schizophrenia ranked 20th among 157 health conditions in terms of disability-adjusted life and 5th among individuals aged 15–44.¹² Mental health services have historically been underdeveloped and underfunded (0.27% of the health budget in 2011

vis-à-vis the recommended 5%),^{13,14} and inequitably distributed (98% of this budget went to the three psychiatric hospitals in Lima).⁶

To address these issues, Peru's Ministry of Health (MINSA) implemented mental health reform. In 2012, Congress approved Law N° 29889, guaranteeing universal access to treatment and social protection.¹⁵ In 2013, mental health care was included in the universal health insurance, followed by a results-based budget program of PEN 78 million (~US\$20 million) in 2015.¹⁶ The Mental Health Law (N° 30947) in 2019 and its 2020 regulation further reinforced these efforts.¹⁷ Collectively, these policies expanded access and facilitated the transition from hospital- to community-based care.¹⁶ In practice, this led to the establishment of 288 community mental health centers since 2015,¹⁸ alongside the integration of psychologists into primary care, and the creation of hospitalization units and child and adolescent maltreatment modules in general hospitals.¹⁶ [Supplementary Figure S1](#)

shows a map of Peru illustrating the geographical distribution of community mental health centers.

MINSa also enacted policies to strengthen services. In 2017, it launched a technical guideline on the organization of community mental health centers.¹⁹ In 2020, another guideline set standards for psychosis care, including medical appointments, family interventions, psychoeducation, and home visits.²⁰ In 2023, a third guideline set standards for continuity of care for severe mental disorders.²¹

The outbreak of COVID-19 coincided with the reform, with Peru recording its first case on March 8 2020.²² The pandemic severely impacted the health system, and community mental health centers and other facilities suspended services on March 16, 2020.²³ This caused a sharp decline in care provision.²³ After a brief reorganization, services gradually resumed, primarily through telepsychiatry.²⁴ Despite preventive strategies, Peru was significantly impacted, recording the highest COVID-19 mortality rate worldwide.²⁵ Health service utilization during pandemics and other times can be influenced not only by supply-side factors like the availability and accessibility of services, but also demand-side factors such as trust in and acceptability of treatment and healthcare institutions.^{26–28}

The extent to which Peru's mental health reform increased service utilization by individuals with psychosis remains unknown. It is also unclear whether the intended transition from tertiary to primary care occurred, or whether utilization increased in underserved areas, such as non-capital, low-income, or remote regions. The impact of COVID-19 on nationwide service use for psychosis is also unknown. Prior studies also examined either all mental disorders or a sector of primary care.²³ This study aims to examine utilization of health services by people with psychosis throughout Peru from 2018 to 2024; evaluate the impact of the pandemic; and assess whether service utilization increased in underserved areas.

We hypothesized that: (a) service utilization by people with psychosis would have increased between 2018 and 2024, (b) in the COVID-19 period, there would have been an immediate decline in service utilization, followed by recovery to pre-pandemic levels, and (c) between 2018 and 2024, service utilization would have increased in primary and regional facilities (relative to tertiary and urban-centralized facilities) and in underserved areas. The study compared service utilization of individuals with psychosis with that of persons with non-psychotic disorders and general medical conditions to examine whether trends for psychotic disorders were distinctive.³

Methods

Design

This longitudinal analysis of repeated cross-sectional data used outpatient morbidity records from Peru's

National Superintendence of Health (SUSALUD) database spanning 2018–2024 and covering nationwide healthcare data from all sectors. SUSALUD is a technical agency attached to MINSa responsible for protecting the health rights of the Peruvian population by monitoring and regulating health service providers across the country. The database was downloaded in March 2025, and formal research was conducted until November 2025.²⁹ This study is reported in accordance with the RECORD guidelines.³⁰

Setting

Peru has a population of 34,038,457 distributed in 24 departments and the constitutional province of Callao, further divided into provinces and districts.³¹ Overall, 25.7% of the population aged ≥ 12 years self-identifies as Indigenous based on their customs and ancestry.³² The Andes run longitudinally through the country, defining three geographical regions: the coast, the highlands, and the rainforest, each characterized by unique environmental and climatic conditions.³³ The Department of Lima, located on the coast, is home to 33.2% of the population.³¹ It also has the highest human development index in the country, reflecting notable relative achievements in health, education, and income. Compared to cities in the highlands and rainforest, coastal cities have higher human development indices.³⁴ Although Peru's health system is grounded in Western medicine, understandings of psychological distress are shaped by cultural pluralism and folkloric syndromes (locally recognized illness categories with distinct explanatory models and traditional treatments) remain prevalent. These shape symptoms of anxiety, depression, and psychosis and influence help-seeking.³⁵

Peru's health system

Peru has a segmented health system divided into public and private sectors ([Supplementary Figure S2](#)).³⁶ In the public sector, MINSa oversees services in Lima, while regional governments oversee facilities elsewhere. The social security sector serves 22.6% of salaried workers and their dependents through its own facilities. Some provincial and district municipalities also offer low-cost health services. The Armed Forces and National Police provide care for their members and families through separate systems. In the private sector, care is delivered through clinics, accessed via private insurance or out-of-pocket payments. In 2024, 4.4% of the population was covered by private insurance or affiliated with the health systems of the Armed Forces and National Police. The costs of care for 64.5% of the population who have no other health insurance are covered by the public insurance system, *Seguro Integral de Salud*.³⁷ Mental health reform has been primarily undertaken by the MINSa and regional government sectors.

Health facilities are classified into primary, secondary and tertiary levels. Primary care emphasizes health promotion, disease prevention, and common health needs. It has health posts and health centers, with health posts offering basic services, focusing primarily on health promotion and prevention. It includes posts without physicians (I-1), posts with a physician (I-2), health centers with two physicians and other professionals (I-3), and centers with inpatient beds (I-4). Secondary care offers greater specialization and includes general hospitals (II-1), those with intensive care units (II-2), and specialized hospitals (II-E). Tertiary care provides the highest specialization, including comprehensive specialty hospitals (III-1), single-specialty hospitals with subspecialties (III-E), and institutions for research, innovation, and training (III-2).³⁸

Before the reform, mental health care was concentrated in tertiary facilities; the reform expanded services at the primary level through community mental health centers, which are I-3 and I-4 facilities¹⁹ and also in secondary care, through the implementation of mental health inpatient units and day hospitals in general hospitals.¹⁶

Following the mental health reform, the government aimed for psychosis care to be primarily delivered in community mental health centers, using antipsychotic medication, psychosocial interventions, and community engagement within a recovery-oriented approach.³⁹ When required, hospitalization is offered in inpatient facilities.

Data sources

We used the SUSALUD database, where each entry contains information on the month and year of care, along with the department, province, and district where the care was provided, including UBIGEO (geographic location code). It also records the age and sex of the patients. Only a single definitive diagnosis is coded, using the 10th version of the International Classification of Diseases (ICD-10). The diagnosis corresponds to a clinical diagnosis made by the physician when they are certain of the condition, based on signs and symptoms evident through clinical assessment and supported by their professional experience and/or auxiliary examinations. The total number of users seen by health services each month is reported. If a user receives care multiple times within the same month for the same diagnosis at the same health facility, they are counted only once. However, if the same person receives care in two different months, they are counted in each month. Health contacts involving different definitive diagnoses for the same person (e.g., one for a psychotic disorder and another for a medical condition) within the same month are counted in all respective diagnostic groups.²⁹

Additional data sources used include population size projections for 2018–2024,³¹ and district-level monetary poverty data for 2018, both from the National Institute of Statistics and Information (*Instituto Nacional de Estadística e Informática*, INEI).⁴⁰

Data selection

We included both nonaffective and affective psychotic disorders under psychotic disorders ([Supplementary Table S1](#)). Non-psychotic mental disorders included the F00–F99 codes, excluding psychosis codes. General medical conditions included any ICD-10 code without the F codes. The SUSALUD database primarily collects clinical diagnoses; however, some health promotion activities, disease control activities, or special medical conditions may also be reported and included in the database.⁴¹

Dependent variables

Number of users seen by any health professional in outpatient services per month during a given month. The indicator was independently assessed for people with psychosis, non-psychotic mental disorders and general medical conditions.

Covariates

Service user variables

Age was originally coded in five-year intervals. We categorized age into life stages: 0–9, 10–19, 20–34, 35–64, and ≥65 years.⁴² Sex was retained in its original binary coding (male and female) as in the SUSALUD database (Gender information was not collected in the database).

Health system variables

For level of care, we retained the original categories (primary, secondary, and tertiary care). For the health sector, the categories included MINSA, Regional government (encompassing provincial and district governments), and social security. The armed forces, national police, and private sector were grouped under the category “others” due to their lower coverage compared to the other sectors.

Geo-socioeconomic variables

Each health facility was assigned a category of monetary poverty, geographical region, and centralization level based on the district where it was located using the INEI classifications, and with UBIGEO serving as the linking variable. SUSALUD categorizes districts into 28 levels of monetary poverty, ranging from 1 (poorest) to 28 (richest). These levels were collapsed into four categories: very low income (1–7), low income (8–14), moderate income (15–21), and adequate income (22–28).⁴⁰ The natural region variable encompassed coastal, highland, and rainforest regions.³³ The centralization variable included the categories: Lima province, which

traditionally has a higher concentration of health facilities, followed by other provincial capital regions and by non-capital regions having the least number of health services.

Statistical analysis

Statistical analyses were conducted using R version 4.3.0 and independently performed for each of the three diagnostic groups. Analysis for each objective was conducted within a specific temporal framework: data for each year from 2018 to 2024 were used to assess variations in health service utilization during this period (Objective 1); changes from pre-COVID-19 period (January 2018–February 2020) to the COVID-19 period (April 2020 to December 2024) were contrasted (Objective 2); and variations in service utilization over time by health system and geo-socioeconomic variables were examined during pre-pandemic (2018–2019) and post-pandemic (2022–2024) periods, excluding 2020–2021 due to service disruptions (Objective 3).

To describe annual variation in health service utilization from 2018 to 2024 (Objective 1), we calculated the annual average of monthly rates per 100,000 inhabitants by averaging monthly user counts over each year, dividing by the population size, and multiplying by 100,000. Annual population estimates provided by the INEI were used as denominators.³¹ These rates were age-standardized using the direct standardization method, applying the World Health Organization's standard age distribution.⁴³ Rate differences and rate ratios between the year 2018 and 2024 were used to measure changes in the utilization of health services.

Objective 2, the impact of the COVID-19 pandemic on service utilization, was assessed using interrupted time series analysis.⁴⁴ The breakpoint was set at March 2020,²² defining a pre-COVID-19 period (January 2018–February 2020) and COVID-19 period (April 2020–December 2024). Preliminary regression models revealed significant temporal autocorrelation in the residuals, warranting the use of a time series approach. Accordingly, we fitted a series of ARIMA models with the logarithm of the monthly service utilization rate as the dependent variable, and two covariates: a post-pandemic time trend and a binary indicator for the post-COVID-19 period, while population size was included as an offset. An autoregressive structure of order 1 (AR(1)) was identified as the best fit. Model selection was based on the Akaike Information Criterion and the Bayesian Information Criterion. The impact on service utilization was evaluated in terms of changes in level (an immediate shift following the onset of the pandemic and associated measures) and the post-pandemic slope (the change in trend over time between pre-COVID-19 and post-pandemic periods), while accounting for serial correlation in the residuals. Of note, because preliminary assessments did not reveal strong, consistent seasonal patterns across the study period, we

opted for a more parsimonious model without seasonal terms.

To examine whether service utilization varied over time by health system and geo-socioeconomic variables (Objective 3), we employed a Poisson regression model using Markov Chain Monte Carlo methods.⁴⁵ The categorical covariates (health system and geo-socioeconomic variables) were analyzed independently in separate models, with their fixed effects specified as different intercepts using a dummy-variable design. The model estimated monthly service utilization rates per 100,000 inhabitants for both pre-pandemic (2018–2019) and post-pandemic (2022–2024) periods, with annual population size included as an offset. Observed monthly case counts were modeled as Poisson-distributed, and separately for the pre- and post-pandemic periods. Weakly informative Normal (0, 10) priors were specified for all fixed-effect parameters, including intercepts. Model fitting was conducted in JAGS (Just Another Gibbs Sampler) with four chains with 20,000 iterations each. The first 500 iterations were discarded as burn-in, and the remaining samples were thinned every 5 iterations. The chains were judged to have converged appropriately, as all parameters were diagnosed to have R-hat statistics <1.01 in all models. Marginal risk ratios were derived from the posterior distribution to compare changes in utilization between the two periods within each category of the covariates. Data from January 2020–December 2021 were excluded from the analysis, as the observed case counts were censored due to the closure or reduced capacity of many facilities during this period, leading to underreporting. This decision was based on the WHO's recommendation that achieving 70% COVID-19 vaccine coverage would enable the safe resumption of routine health services.⁴⁶ Peru reached this threshold in December 2021,⁴⁷ prompting MINSA to reopen most health facilities nationwide.⁴⁸ Previous studies have recognized this benchmark as indicative of the restoration of health services.⁴⁹

Ethics approval

This study is a secondary analysis of publicly available, open-access data and was deemed as not requiring approval from an ethics committee after consultation with pertinent local stakeholders.

Role of the funding source

The funders had no role in study design, data collection, data analysis, interpretation, or manuscript preparation.

Results

From 2018 to 2024, health facilities across Peru registered 114,343,160 entries in the SUSALUD database. Of these, 13,243,268 were repeated entries (duplicates arising from data entry artefacts) and 13,838 contained

missing values for key variables (e.g., diagnosis and number of users seen). All missing data were excluded from the analysis, assuming that the missingness mechanism was missing completely at random. The final sample included 105,086,054 entries, representing 91.9% of the original dataset.

Utilization of health services

The annual average of monthly rates of users seen for psychosis decreased from 28.2 per 100,000 inhabitants in 2018 to 19.2 in 2024, representing a reduction of 32% (rate ratio: 0.68). In contrast, the rate for non-psychotic mental disorders increased from 225.2 in 2018 to 304.6 in 2024, reflecting a rise of 35% (rate ratio: 1.35). For general medical conditions, the rate went from 12,688.1 in 2018 to 12,370.4 in 2024, indicating a slight reduction of 3% (rate ratio: 0.97). Age-standardized rates for psychosis, non-psychotic mental disorders, and general medical conditions remained consistent with the crude rates. Between 2018 and 2024, psychosis service utilization rates declined more among males than females, non-psychotic mental disorder service utilization rates increased more among females than males, and general medical condition service utilization rates decreased in males but increased in females. Across age groups, psychosis service utilization rates declined consistently, while rates of service utilization for non-psychotic mental disorders increased in all age groups, with the highest increase being for those between 10 and 19 years. General medical condition service utilization rates also rose across age groups, except among children aged 0–9 (Table 1 and Fig. 1).

Impact of the COVID-19 pandemic on health service utilization

The onset of the COVID-19 pandemic led to comparably sharp declines in the monthly rate of service utilization across all diagnostic groups. In March 2020, service utilization rates fell to 37.9% of expected levels for psychosis (95% CI: 29.0%–49.8%), 37.0% of expected levels for non-psychotic mental disorders (95% CI: 27.6%–49.6%), and 35.3% of expected levels for general medical conditions (95% CI: 28.2%–44.2%). Following these abrupt reductions, service utilization gradually recovered over the subsequent months. The monthly rate of service utilization increased by 1.3% for psychosis (95% CI: 0.4%–2.2%), 2.6% for non-psychotic mental disorders (95% CI: 1.8%–3.4%) and 2.2% for general medical conditions (95% CI: 1.6%–2.8%). Confidence intervals for these estimates partially overlap (Table 2 and Fig. 2). As an example of these distinct patterns, service utilization in February 2024, compared with February 2020 (the month preceding the onset of the pandemic in Peru), decreased by 30.2% (36.1% in the fitted model) for psychosis, increased by 29.8% (30.9% in the fitted model) for non-psychotic mental

disorders, and increased by 9.2% (9.4% in the fitted model) for general medical conditions.

Changes in service utilization according to health system and geo-socioeconomic variables

Health system variables

Model-based estimates indicated that, between the pre- and post-pandemic periods, the monthly service utilization rate for psychosis rose from 1.7 to 3.1 per 100,000 in primary care, while it declined from 19.0 to 10.4 per 100,000 in tertiary care. The proportion of primary relative to tertiary care utilization rose from 9% to 30%. For non-psychotic mental disorders, estimated service utilization increased in both primary (from 41.2 to 68.4 per 100,000) and secondary care (from 92.9 to 119.2 per 100,000), but declined in tertiary care (from 97.2 to 74.6 per 100,000). In this case, primary care rose from 42% to 92% of tertiary care levels. For general medical conditions, estimated utilization declined in both primary and tertiary care, but increased in secondary care (Table 3).

Between the pre- and post-pandemic periods, model estimates showed an increase in psychosis-related service utilization in facilities operated by regional governments (from 4.6 to 6.1 per 100,000 inhabitants), while a decline was observed in MINSA facilities (from 10.9 to 6.1 per 100,000). Whereas MINSA provided 135% more psychosis-related care than regional governments before the pandemic, this difference disappeared afterward. A similar shift occurred for non-psychotic mental disorders: estimated utilization increased in regional government facilities (from 75.6 to 101.4), while it declined in MINSA facilities (from 52.5 to 42.4), reducing MINSA's share relative to regional governments from 69.4% to 41.8%. In contrast, for general medical conditions, model estimates showed a decline in utilization in both MINSA and regional government facilities but increased in those operated by Social Security (Table 3). Percent changes in service utilization between pre-and-post pandemic periods by level of care and health sector are shown in Supplementary Figure S3.

Geo-socioeconomic variables

Based on model-derived estimates, service utilization for psychotic disorders increased more than threefold in very low-income areas (from 0.08 to 0.28 per 100,000), while it slightly declined in the highest-income areas (from 8.9 to 7.2). Nonetheless, large disparities persisted: very low-income districts accounted for only 0.9% of the rates seen in the highest-income areas before the pandemic, increasing modestly to 3.9% afterward. For non-psychotic mental disorders, model estimates indicated increases across all income levels; however, disparities remained. Before the pandemic, very low-income districts accounted for just

Indicators	Year							Rate difference	Rate ratio
	2018	2019	2020	2021	2022	2023	2024	(2024–2018)	(2024/2018)
Psychosis									
Total population									
Average monthly users	8908.33	8821.42	4935.92	6178.42	6918.67	6540.92	6550.50	–2357.83 ^b	0.74 ^c
Crude rate ^a	28.22	27.45	15.13	18.70	20.72	19.39	19.24	–8.98	0.68
Standardized rate ^a	28.21	27.10	14.77	18.11	20.01	18.70	18.47	–9.74	0.65
Sex (crude rate) ^a									
Male	30.24	29.25	16.47	19.95	22.13	20.48	20.25	–10.00	0.67
Female	26.24	25.68	13.81	17.47	19.32	18.32	18.26	–7.98	0.70
Age (crude rate) ^a									
0–9	0.18	0.25	0.12	0.19	0.17	0.17	0.19	0.01	1.05
10–19	10.90	9.19	4.55	5.63	8.91	8.91	8.33	–2.56	0.76
20–34	32.18	28.99	16.11	19.37	20.96	20.96	21.07	–11.11	0.65
35–64	47.47	47.15	25.99	31.70	30.84	30.84	30.15	–17.32	0.64
≥65	33.47	33.96	17.63	23.49	23.40	23.40	24.58	–8.90	0.73
Non-psychotic mental disorders									
Total population									
Average monthly users	71,090.75	79,633.42	43,491.08	58,678.58	72,171.58	92,772.58	103,672.75	32,582.00 ^b	1.46 ^c
Crude rate ^a	225.24	247.84	133.30	177.62	216.10	275.08	304.58	79.33	1.35
Standardized rate ^a	225.55	247.38	131.62	174.39	213.76	273.88	303.49	77.94	1.35
Sex (crude rate) ^a									
Male	208.97	224.14	117.04	150.23	188.35	245.03	276.83	67.86	1.32
Female	241.23	271.16	149.32	204.61	243.44	304.65	331.85	90.63	1.38
Age (crude rate) ^a									
0–9	259.20	282.94	107.89	140.50	342.12	342.12	410.01	150.81	1.58
10–19	204.57	218.89	96.15	134.34	309.07	309.07	351.48	146.90	1.72
20–34	144.97	150.66	92.87	120.84	184.83	184.83	201.75	56.78	1.39
35–64	208.78	224.81	138.46	181.57	221.17	221.17	230.66	21.87	1.10
≥65	494.68	596.64	336.57	452.03	523.26	523.26	563.02	68.34	1.14
General medical conditions									
Total population									
Average monthly users	4,004,634.75	3,883,577.08	1,869,482.00	2,265,870.17	2,915,407.25	3,763,878.08	4,210,704.08	206,069.33 ^b	1.05 ^c
Crude rate ^a	12,688.10	12,086.55	5730.05	6858.94	8729.63	11,160.22	12,370.43	–317.67	0.97
Standardized rate ^a	12,707.89	12,037.70	5660.89	6699.24	8502.89	10,853.38	11,999.31	–708.57	0.94
Sex (crude rate) ^a									
Male	10,574.02	9727.86	4695.51	5421.05	6767.19	8663.18	9673.97	–900.05	0.91
Female	14,765.43	14,408.12	6749.21	8275.48	10,662.06	13,617.33	15,021.77	256.34	1.02
Age (crude rate) ^a									
0–9	19,853.70	16,068.16	6892.83	6387.81	11,880.12	11,880.12	12,922.12	–6931.58	0.65
10–19	7580.27	7410.40	3025.78	3057.54	6436.99	6436.99	7800.49	220.22	1.03
20–34	8004.20	7217.22	3809.20	4884.38	7133.86	7133.86	8051.37	47.17	1.01
35–64	11,866.29	11,968.72	5934.16	7717.38	11,765.94	11,765.94	12,727.41	861.12	1.07
≥65	24,927.23	27,298.48	12,856.34	16,178.09	25,219.39	25,219.39	27,550.72	2623.49	1.11

^aPer 100,000 inhabitants. ^bDifference between the average monthly users in 2024 and 2018. ^cRatio of average monthly users in 2024 to 2018.

Table 1: Annual average of monthly rates of service utilization for psychosis, non-psychotic mental disorders and general medical conditions, 2018–2024.

1.7% of the rates seen in the highest-income areas, rising to 3.3% in the post-pandemic period. For general medical conditions, service utilization declined in both very low-income and more affluent areas (Table 4).

Model estimates also showed that service utilization rates for psychosis declined on the coast (from 23.1 to 14.0 per 100,000), slightly increased in the highlands (from 3.9 to 4.9), and remained largely unchanged in

the rainforest (from 0.9 to 0.8). The reduced ratios between the coast and highlands (from 6.0 to 2.8) and the coast and rainforest (from 26.8 to 17.3) are mainly attributable to the decline in rates seen on the coast. Service utilization for non-psychotic mental disorders increased across all three regions, with particularly notable gains in the highlands (from 59.6 to 75.8 per 100,000) and rainforest (from 11.4 to 17.8 per 100,000).

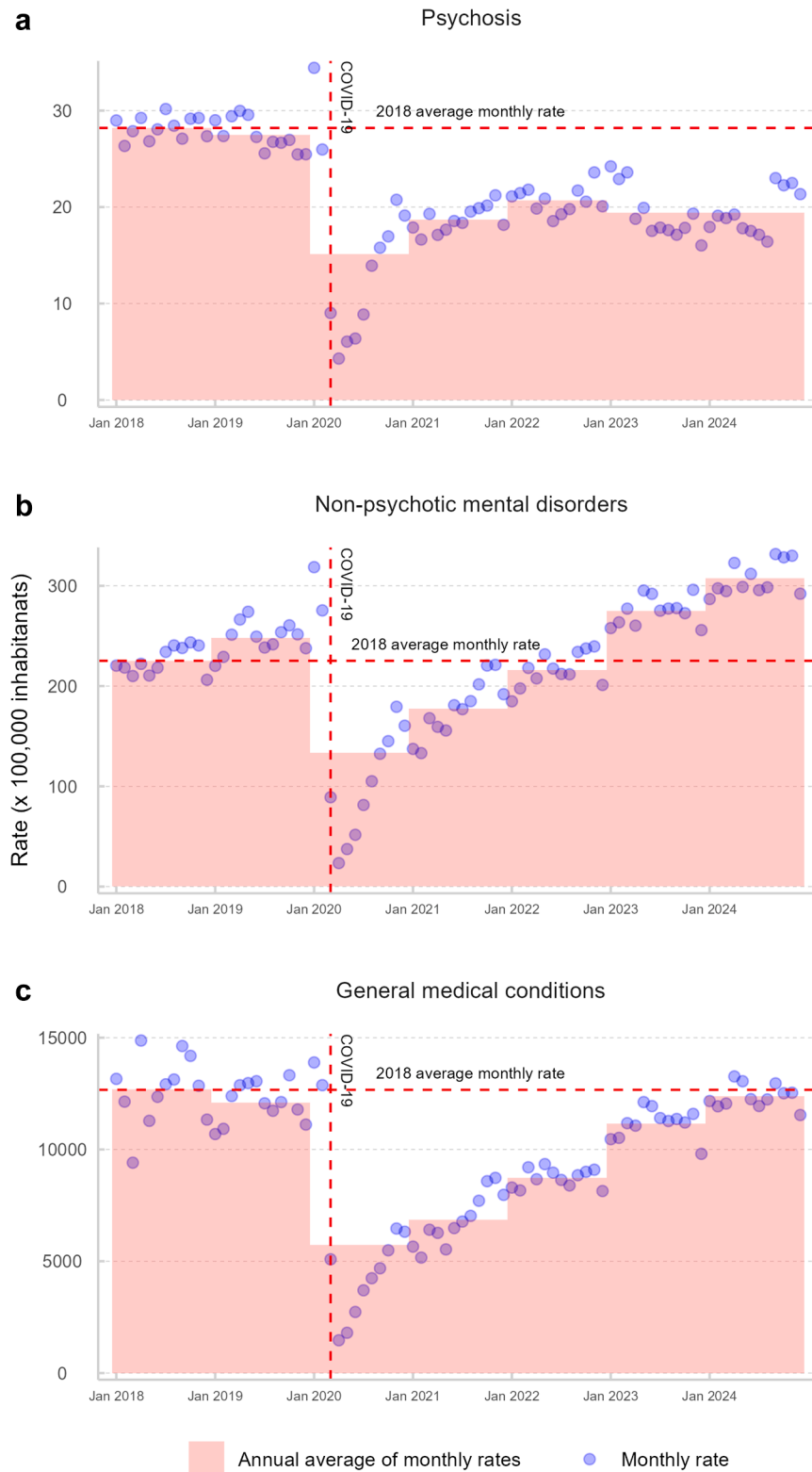


Fig. 1: Monthly rate and annual average of monthly rates of service utilization for a) psychosis, b) non-psychotic mental disorders, and c) general medical conditions in Peru, 2018–2024. The red dashed vertical line indicates the month when the COVID-19 pandemic began in Peru (March 2020). The red dashed horizontal lines represent the 2018 average monthly rate for each of the three diagnostic groups.

For general medical conditions, utilization increased in the rainforest but declined on the coast and in the highlands (Table 4).

In terms of level of centralization, model-derived rates of service utilization for psychotic disorders declined in Lima province (from 17.4 to 8.9 per 100,000), while it remained stable in other provincial capital regions (from 7.5 to 7.8) and in non-capital regions (2.9 in both periods). For non-psychotic mental disorders, service utilization decreased in Lima (from 111.3 to 98.5) but increased in other provincial capital regions (from 81.7 to 113.7) and non-capital regions (from 43.6 to 53.3). Before the pandemic, Lima's rate was 36.2% higher than that of other provincial capitals; after COVID-19, it became 13.4% lower than in other provincial capitals. Service utilization for general medical conditions declined across all three regions (Table 4). Percent changes between pre-and-post pandemic periods by poverty level, geographical region, and centralization are shown in Supplementary Figure S4.

Discussion

This study evaluated service utilization by people with psychosis from 2018 to 2024 during Peru's mental health reform and the COVID-19 pandemic. Three findings stand out. First, contrary to our hypothesis, utilization for psychotic disorders declined and remained below 2018 levels. This contrasts with service utilization for general medical conditions which returned to 2018 levels and for non-psychotic disorders, which increased from 2018 to 2024. Second, as hypothesized, utilization fell across all three conditions at the onset of COVID-19, but only rates for psychosis failed to return to baseline. Third, as hypothesized, primary care use expanded for psychotic and non-psychotic disorders. But utilization in underserved areas did not increase for psychotic disorders, but only for non-psychotic conditions. These findings suggest that people with psychosis face persistent barriers to care, with the pandemic exacerbating gaps despite ongoing reform. This may reflect delayed implementation and effects of reform and structural barriers, rather than outright policy failure. Reform may take longer to benefit individuals with complex, intersecting needs/disadvantages, especially if unaccompanied by an adequate, appropriately trained and resourced workforce.

The increase in service utilization for non-psychotic mental disorders coincided with the expansion of reform-related resources and policies,¹⁶ suggesting a possible association, although this cannot be confirmed due to the observational and administrative nature of the data. This increase is also in line with global trends in anxiety and depression among youth.⁵⁰ What is disconcerting is the divergence from psychosis, for which service utilization stagnated below 2018 levels through 2024, despite the reform targeting all mental

Effect measures	Rate	Lower 95%CI	Upper 95%CI
Psychosis			
Intercept	0.00030	0.00024	0.00039
Level change (March 2020)	0.37999	0.29005	0.49782
Trend change	1.01308	1.00439	1.02186
Non-psychotic mental disorders			
Intercept	0.00249	0.00201	0.00309
Level change (March 2020)	0.36998	0.27617	0.49566
Trend change	1.02614	1.01792	1.03441
General medical conditions			
Intercept	0.12248	0.10563	0.14202
Level change (March 2020)	0.35300	0.28187	0.44207
Trend change	1.02235	1.01635	1.02838

An autoregressive structure of order 1 AR(1) was considered. The intercept represents the monthly rate of service utilization at the beginning of the study period. The level change reflects the immediate impact of the COVID-19 pandemic on service utilization in the first month after March 2020. The trend change captures the sustained effect of the pandemic on monthly utilization rates over the subsequent period.

Table 2: Interrupted time series analysis of the impact of the COVID-19 pandemic on monthly rates of service utilization in Peru's health services, 2018–2024.

health conditions and universal health insurance coverage.¹⁶

One likely explanation for the trends we observed for psychotic disorders is disengagement from services. Globally, about half of people with psychosis disengage from services, even specialized ones.^{51,52} In Peru, service disengagement rates are unavailable. Epidemiological data from 2012 show that 64% of those with psychosis did not recognize having a condition, and less than 20% reported receiving care in Lima, a setting with relatively high service availability.¹¹ Service utilization in underserved areas may be lower. This exposes a systemic gap in reaching and retaining individuals with psychosis in care.

Through community health centers and free care, Peru's reform has likely addressed the health system dimensions of accessibility, availability, and affordability of services. However, the model's acceptability and appropriateness in patients' and families' perceptions is unclear. In psychosis, access and sustained engagement are influenced by stigma, insight, social isolation, and cultural understandings of mental health, which necessitates services aligning with the needs, lived experiences and contexts of patients and their families.⁵³

Service utilization sharply declined with COVID-19 in 2020 across psychosis, non-psychotic mental disorders and general medical conditions, reflecting the closure of healthcare facilities and movement restrictions rather than reduced needs. This is consistent with the 27% reduction in mental health visits in Mexico,⁵⁴ but unlike high-income countries, where rapid increases in teleconsultations corrected initial declines in visits.^{55,56} Peru required significant time for rollout of teleconsultations,²⁴ highlighting disparities across countries in their capacity to respond to emergencies.

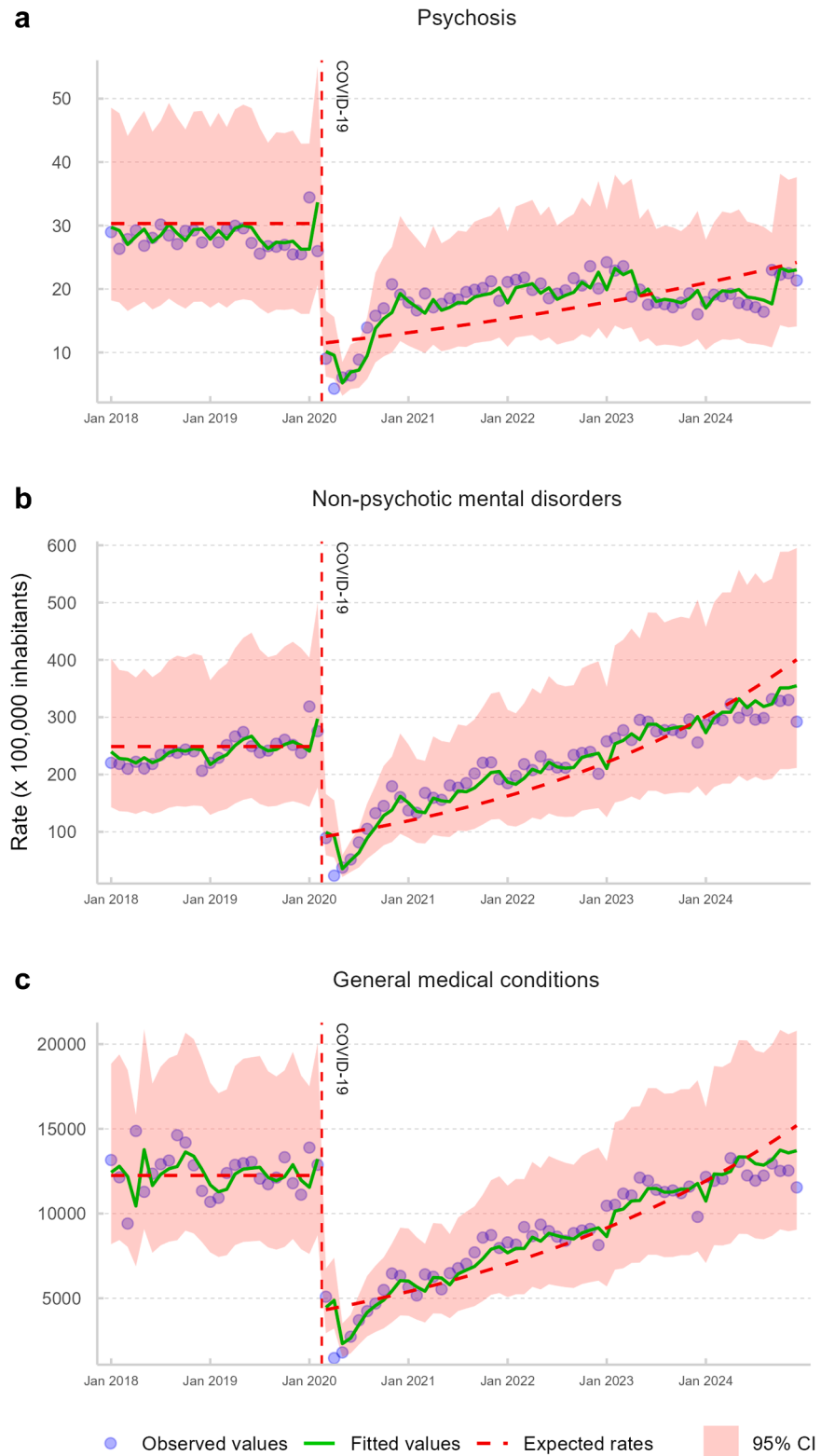


Fig. 2: Impact of the COVID-19 pandemic on monthly rates of service utilization for a) psychosis, b) non-psychotic mental disorders, and c) general medical conditions in Peru, 2018–2024. Observed values represent the raw monthly service utilization rates. Fitted values correspond to the rates predicted by the AR(1) model, including both the fixed effects and the autoregressive component. The Expected rate reflects the predicted trend based on fixed effects only. The shaded area indicates the 95% confidence interval for the interpolated rates. The vertical dashed line marks the onset of the COVID-19 pandemic (March 2020).

Although all three diagnostic groups experienced similar initial declines, recovery of service utilization rates post COVID-19 differed, with people with psychosis having the lowest rates. This may be underpinned by the exacerbation of pre-existing barriers,⁵⁷ poor digital access,⁵⁸ and/or a preference for face-to-face appointments.⁵⁹ Yet these factors alone cannot explain persistent reductions through 2024, especially after 70% COVID-19 vaccine coverage and the commencement of regular/hybrid services around December 2021.⁴⁷

Increased mortality among people with psychosis during COVID-19 may have reduced the number of service users. Peru experienced one of the highest mortality rates globally.²⁵ Research has consistently reported higher COVID-19-related deaths among people with psychosis compared with those with non-psychotic disorders and the general population, particularly among older individuals and men.^{60,61} Proposed mechanisms include delayed help-seeking, lower vaccination coverage, immune system dysregulation, and a high burden of comorbid physical illnesses.⁶² Consistent with these findings, our data show that fewer men and individuals aged over 35 accessed services in 2024, which may be compatible with this hypothesis. However, this cannot be directly tested without individual-level mortality linkage data.

In low-and middle-income countries, indirect impacts of COVID-19 on social determinants compounded disadvantages like economic hardship, stigma, rights violations, and underfunded/poorly implemented services.⁵⁷ In Peru, poverty increased from 20.5% of the population in 2018 to 29% in 2023.⁶³ Poverty is strongly and bidirectionally linked to vulnerability to mental illness,⁶⁴ and reduced service access.⁶⁵ These broader factors, amplified during the pandemic, may have contributed to the persistently low levels of service utilization among individuals with psychosis in the post-pandemic period.

In some countries, mental health service demand and use increased during and after COVID-19, partly reflecting heightened psychological distress, greater public recognition of mental health needs and increased availability of virtual care.^{66–68} This was not the case for psychotic disorders in Peru, likely because of the severity of the pandemic, combined with health system constraints and the exacerbation of social disadvantages. Unfortunately, data on public perceptions of mental health needs and services during and after the pandemic are not available in Peru.

Our results reveal progress toward a major reform goal of shifting mental health care from tertiary to primary settings. This transition was enabled by political commitment, funding (87% of the mental health reform budget was allocated to primary care),¹⁶ and the rapid establishment of community mental health centers. Service utilization for mental disorders grew more

	Pre-pandemic period			Post-pandemic period		
	Rate ^a	Lower 95% CrI	Upper 95% CrI	Rate ^a	Lower 95% CrI	Upper 95% CrI
Psychosis						
Level of care						
Primary	1.73	1.71	1.76	3.06	3.03	3.09
Secondary	6.94	6.88	7.00	6.18	6.14	6.23
Tertiary	19.01	18.91	19.11	10.36	10.30	10.41
Health sector						
Ministry of health	10.88	10.81	10.96	6.06	6.02	6.11
Regional Government	4.62	4.57	4.67	6.05	6.01	6.10
Social security	9.43	9.37	9.50	5.34	5.30	5.39
Others	2.90	2.86	2.94	2.32	2.29	2.34
Non-psychotic mental disorders						
Level of care						
Primary	41.23	41.09	41.37	68.35	68.20	68.49
Secondary	92.92	92.69	93.13	119.20	119.01	119.39
Tertiary	97.16	96.94	97.38	74.56	74.40	74.71
Health sector						
Ministry of health	52.51	52.35	52.67	42.43	42.32	42.55
Regional Government	75.59	75.39	75.78	101.39	101.21	101.57
Social security	72.56	72.37	72.75	68.16	68.01	68.31
Others	35.98	35.85	36.11	53.55	53.42	53.68
General medical conditions						
Level of care						
Primary	5377.08	5375.46	5378.69	4163.04	4162.20	4164.29
Secondary	4748.10	4746.68	4750.00	5008.54	5007.54	5010.04
Tertiary	1982.47	1981.48	1983.46	1506.58	1505.83	1507.19
Health sector						
Ministry of health	834.81	834.14	835.47	656.88	656.42	657.34
Regional Government	5338.50	5336.90	5340.10	3597.88	3596.80	3598.96
Social security	3505.89	3504.84	3507.29	3742.09	3740.97	3743.21
Others	2862.64	2861.50	2863.79	2768.33	2767.22	2769.16

^aPer 100,000 inhabitants. CrI: Credible interval, Pre: Pre-pandemic period (2018–2019), Post: Post-pandemic period (2022–2024).

Table 3: Monthly rates of service utilization by health system variables, 2018–2024.

in regional government facilities than in those operated by MINSA, highlighting much-desired progress in the decentralization of healthcare outside Lima. Meanwhile, social security facilities saw declines, likely due to a shift toward community centers that were perceived as more available and accessible.⁶⁹

Over the study period, service utilization grew in historically underserved areas for non-psychotic mental disorders. By strengthening primary health care, reform may have improved equity in access to services for individuals with these conditions, with respect to geographic (region and centralization level) and economic conditions (poverty level). But causality cannot be confirmed given our study design. Importantly, however, the impact was minimal for individuals with

	Pre-pandemic period			Post-pandemic period		
	Rate ^a	Lower 95% CrI	Upper 95% CrI	Rate ^a	Lower 95% CrI	Upper 95% CrI
Psychosis						
Monetary poverty level						
Very low income	0.08	0.08	0.09	0.28	0.27	0.29
Low income	1.19	1.17	1.22	1.55	1.53	1.57
Moderate income	17.66	17.57	17.76	10.74	10.69	10.80
Adequate income	8.90	8.83	8.96	7.21	7.16	7.25
Geographical region						
Coast	23.13	23.02	23.24	14.01	13.95	14.08
Highland	3.85	3.80	3.89	4.96	4.92	5.00
Rainforest	0.86	0.84	0.88	0.81	0.79	0.83
Centralization level						
Lima province	17.39	17.31	17.50	8.97	8.92	9.03
Capital province	7.51	7.45	7.57	7.88	7.83	7.93
Non-capital province	2.93	2.89	2.97	2.93	2.90	2.96
Non-psychotic mental disorders						
Monetary poverty level						
Very low income	1.50	1.47	1.53	3.36	3.33	3.40
Low income	20.07	19.97	20.18	26.95	26.86	27.05
Moderate income	129.10	128.84	129.35	135.83	135.62	136.04
Adequate income	85.97	85.76	86.17	99.37	99.19	99.55
Geographical region						
Coast	165.50	165.34	165.84	171.91	171.74	172.09
Highland	59.62	59.44	59.80	75.79	75.64	75.94
Rainforest	11.43	11.35	11.50	17.83	17.76	17.90
Centralization level						
Lima province	111.29	111.04	111.52	98.48	98.31	98.66
Capital province	81.71	81.51	81.92	113.72	113.52	113.90
Non-capital province	43.64	43.49	43.79	53.34	53.21	53.47
General medical conditions						
Monetary poverty level						
Very low income	762.19	761.58	762.81	390.85	390.50	391.21
Low income	2171.34	2170.30	2172.38	1721.31	1720.57	1722.05
Moderate income	5402.25	5400.57	5403.92	5010.29	5009.04	5011.55
Adequate income	4048.86	4047.44	4050.27	3640.33	3639.24	3641.39
Geographical region						
Coast	6707.62	6707.62	6714.33	6167.20	6167.20	6167.20
Highland	5094.92	5094.92	5100.02	3619.17	3619.17	3622.79
Rainforest	578.82	578.25	579.40	976.52	975.55	976.52
Centralization level						
Lima province	4298.84	4297.55	4300.13	3647.15	3646.05	3648.24
Capital province	4153.47	4152.23	4155.13	3965.55	3964.36	3966.74
Non-capital province	3932.38	3930.81	3933.56	3152.34	3151.39	3153.28

^aPer 100,000 inhabitants. CrI: Credible interval, Pre: Pre-pandemic period (2018–2019), Post: Post-pandemic period (2022–2024).

Table 4: Monthly rates of service utilization by socioeconomic variables, 2018–2024.

psychosis across these three geo-socioeconomic variables. Barriers to accessing care for psychosis, including intersecting disadvantages and limited mental health literacy, may be especially pronounced in poor and

remote regions.⁴⁰ Also, elevated COVID-19 mortality in rural highlands and jungle regions (with limited health service capacity) may have disproportionately affected people with severe mental disorders.⁷⁰

These results should be interpreted cautiously. Treating psychosis requires pharmacological and psychosocial interventions, as outlined by Peru guidelines.^{20,21} Our analysis only evaluated numbers of service contacts, not the adequacy or quality of treatment. This is particularly important for Peru, where evidence shows low rates of appropriate treatment for mental disorders,⁷¹ and the availability of psychotropic medications.⁷² Likewise, our results preclude commentary on how the treatment gap changed after reform since current prevalence estimates are not available. Nonetheless, the observed stagnation in service use (2023–2024), together with the likely growth in incident cases, suggests that the treatment gap for psychosis may be widening, which has significant consequences for affected individuals, their families and society as whole.

An important question raised by our findings is whether the observed decline in psychosis-related service utilization reflects reduced help-seeking and engagement in care, excess mortality during and after the COVID-19 pandemic, or a true reduction in the incidence of psychotic disorders. Distinguishing the contributions of these explanations is critical for interpreting utilization trends and guiding appropriate policy and service responses. Future research could address this gap via longitudinal cohorts of individuals diagnosed with psychosis, allowing the direct assessment of excess mortality, service quality, treatment continuity, and disengagement over time; qualitative studies examining trust, barriers to accessing and using services, alignment between available services and explanatory models, etc.; and the linking of administrative service utilization data with mortality registries.

As a priority, there is a need to systematically evaluate, improve and monitor service utilization and quality of care in psychosis, in alignment with MINSA-developed guidelines.^{20,21} This includes the availability, quality and providers' use of psychotropic medication, psychosocial interventions, and community-based activities. It is also essential to assess the accessibility, acceptability and appropriateness of current care from the perspectives of patients, their families, and health-care providers, as these can influence service use.^{26,73} If shortcomings are identified, strategies, shown effective in identifying and engaging individuals with psychosis in other contexts,⁷⁴ could be adapted and integrated. For example, assertive community treatment for individuals with schizophrenia-spectrum disorders has been shown to achieve very low disengagement rates (3.4%) and high levels of medication adherence (78.3%) in real-world settings.⁷⁴

At the public health level, it is crucial to examine the COVID-19 pandemic's impact on mortality among people with psychosis. Because our study cannot distinguish mortality from service disengagement, future studies with cohorts established using hospital records of patients with psychosis could clarify whether reduced utilization reflects disengagement, death or both. If elevated mortality is confirmed, future emergencies/crises should include protective measures targeting this population. More broadly, the pandemic exposed systemic fragility in addressing mental and physical illnesses. Preparedness planning for global health emergencies must prioritize timely, equitable, and sustained responses to mental health needs.

There is no evidence for psychosis incidence having declined during the study period. Robust epidemiological data, including population-based estimates of psychosis incidence, prevalence and treatment coverage, can inform planning and resource allocation, and help evaluate ongoing reform. Beyond Peru, our findings can guide evaluation, policy and service design in the region as several countries are implementing comparable reforms. Future comparative evaluations across countries could identify which service reform models and policy mechanisms most effectively reduce inequities in access to care for psychosis.

Limitations

Given the study's naturalistic approach, we cannot attribute changes solely to reform or the pandemic and more generally, make conclusions about mechanisms underpinning our findings. Factors, such as strikes, natural disasters or staff turnover, may have played a role in both service utilization and data reporting. We assumed a constant mean rate per year, with all fluctuations caused by external factors embedded within the variance term of the statistical model. We explored more flexible models including constant monthly rates and random effects to capture additional variance (e.g., pre-pandemic temporal variation). However, they did not improve model fit or substantively change inference, and Markov Chain Monte Carlo estimation showed poor convergence, likely reflecting weak parameter identifiability because the data were not sufficiently informative to support the more complex parameterization.⁷⁵ We did not include the timing of specific policies/guidance documents in our models. Multiple national guidance documents were released during the study period. Their effects on service utilization were unlikely to have been immediate or discrete, limiting the interpretability of policy-timing indicators.

We exclusively analyzed outpatient care, which better reflects continuity and accessibility than inpatient data but misses crisis-oriented service use. Future studies should address inpatient utilization. Our estimates may underrepresent primary care use across all

three diagnostic groups, as reporting from primary care facilities will only be mandated from 2027.⁷⁶

We lacked data on care modality (in-person vs. telemedicine) and on race or ethnicity in our database. This limited our ability to assess potential inequities in access to care across population groups, which is particularly relevant given that around one-quarter of the Peruvian population aged ≥ 12 years reports having Indigenous ancestry and Indigenous groups are particularly known to face healthcare barriers.^{32,77} Moreover, the database includes information only on biological sex and does not capture gender identity. Therefore, the analyses could not assess how gender-related social and behavioral factors might influence health service utilization patterns.

We cannot fully assess the quality of data reported to SUSALUD; however, SUSALUD conducts ongoing review and corrective processes. The comorbidity of psychosis with other mental disorders (e.g., substance use disorders), and physical conditions, is common. However, because the SUSALUD database records only one diagnosis per health care contact, our analysis was restricted to this primary diagnosis recorded for each contact. Moreover, the same person could contribute encounters to more than one diagnostic category across different visits in the same month, which may introduce correlation across groups and should be considered when interpreting comparisons between diagnostic categories.

Despite the noted limitations, to our knowledge, this is the first national study of service utilization for psychosis in Peru and one of the few in Latin America. Its strengths include a large, nationally representative, population-based dataset spanning all health sectors; the integration of multiple official data sources and rigorous statistical methods. Database curation in collaboration with SUSALUD enhanced accuracy.

Conclusions

Our study shows the feasibility and value of using population-based administrative data to track mental health service utilization, including in low- and middle-income and Global South countries, where they have been underutilized. Encouragingly, Peru's reform has expanded care for non-psychotic disorders, including in underserved areas. However, the persistent underutilization of services by persons with psychosis highlights the need to address the acceptability, appropriateness, and continuity of care for psychosis, particularly in underserved areas, and to strengthen system preparedness for global crises.

Contributors

RV developed the research idea, downloaded the databases, conducted the analysis, interpreted the results, and wrote the manuscript. JPM supported the interpretation of the results and provided critical feedback that strengthened the quality and clarity of the manuscript from a public health perspective. CG contributed to the interpretation of the

findings and offered substantive feedback that enhanced the manuscript from an epidemiological perspective. PH provided support in analyzing large, complex longitudinal data. SNI contributed to the conceptualization of the project, the development of the methodology, the oversight of the statistical analysis, and provided detailed feedback throughout the writing process. RV, PH, and SNI accessed and verified the underlying data. All authors read and approved the final version of the manuscript.

Data sharing statement

The data used in this study come from the Peru's National Superintendence of Health (SUSALUD) outpatient morbidity database, which is publicly available. The database can be freely accessed through the SUSALUD open data portal: <http://datos.susalud.gob.pe>.

Editor note

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Declaration of interests

Authors declare no competing interests.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.lana.2026.101542>.

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