Jurnal Jaminan Kesehatan Nasional
Volume 5. Number 2., (Dec, 2025). Page 307 - 321
DOI: 10.53756/jjkn.v5i2.379
ISSN : 2798-6705 (online) | 2798-7183 (print)

Research Paper

Length of Stay and Recovery Predictors Among Schizophrenia Inpatients in Indonesia: A Survival Analysis

Muhamad Zakki Saefurrohim[1*], Eka Putri Rahayu[1], Rea Ariyanti[1], Agustin Putri Rahayu[1], Hadi Pratomo[2]

[1]Universitas Mulawarman, Samarinda, Indonesia
[2]Universitas Indonesia, Depok, Indonesia

Abstract: Schizophrenia contributes significantly to global disease burden, with hospitalization management being crucial for treatment outcomes. This study aimed to determine factors influencing the length of stay and recovery outcomes among schizophrenia patients in Indonesian referral health facilities. Secondary data analysis was conducted using BPJS Kesehatan sample data from 2023. Of 54,820 mental health records, 2,562 schizophrenia patients treated at referral facilities were analyzed. Cox proportional hazards regression was used to identify factors associated with discharge status, and Kaplan-Meier analysis was used to examine the distribution of length of stay. Mean length of stay was 19.9 days. Significant factors associated with better recovery outcomes included: treatment at general hospitals (HR=2.31, p<0.001), public hospitals (HR=0.57, p<0.001), undifferentiated (HR=1.45, p<0.001) and catatonic schizophrenia subtypes (HR=1.70, p=0.029), single medical procedure (HR=0.73, p<0.001), and local treatment facilities (HR=1.42, p=0.028). Healthcare service factors and clinical characteristics significantly outweigh demographic factors in determining recovery outcomes. These findings emphasize the importance of healthcare service quality and accessibility in the treatment of schizophrenia, supporting integrated care models and universal healthcare access policies.

Keywords: Length of Stay; Schizophrenia; Kaplan-Meier; Cox Analysis

Introduction

Schizophrenia is a serious mental illness that affects how a person thinks, feels, and behaves. Schizophrenia has been identified as one of the fifteen leading causes of disability on a global scale. The condition, known as schizophrenia, is characterized by a range of symptoms, including delusions, hallucinations, disorganized speech or thinking, catatonic symptoms, and negative symptoms that persist for a minimum of six months (Anbasse et al., 2024). According to the World Health Organization (WHO), schizophrenia is among the top ten diseases contributing to the global burden of disease (GBD), accounting for 13,4

Corresponding author name can be contacted at: saefurrohim@fkm.unmul.ac.id

million life years lived with disability. This figure represents 1.1% of total disability-adjusted life years (DALYs) and 2.8% of total life years lived with disability (Harvey & Strassnig, 2019). In Indonesia, the 2023 Indonesian Health Survey found a prevalence of 4% for households with schizophrenic mental disorders based on symptoms (Kemenkes RI, 2023). Despite the relatively low prevalence of schizophrenia in the general population, the disease contributes significantly to the global burden of disease due to its severity, chronic nature, and impact on individual lives (Rantala et al., 2022).

A considerable proportion of patients diagnosed with schizophrenia manifest irritability, a symptom frequently accompanied by delusions and hallucinations. This phenomenon can present significant challenges for their families, given the severity of these symptoms. Consequently, the delivery of comprehensive treatment for schizophrenia frequently necessitates hospitalization in a designated healthcare facility. This is particularly significant during the acute phase or when symptoms are uncontrolled. (Cheng et al., 2022). The length of stay of schizophrenia patients in referral health facilities is a significant indicator in assessing the effectiveness of health services, the financial burden, and the quality of life of patients after discharge from the hospital. The appropriate management of LOS has become a significant issue in clinical psychiatry, as it is essential to balance treatment quality with the efficient use of medical resources. Prolonged stays in healthcare facilities have been associated with an increased risk of nosocomial complications, stigma, dependency on facilities, and elevated healthcare expenditures. Conversely, inadequate treatment duration, characterized by brief stays, poses a significant risk of relapses and subsequent readmission. (Allam, 2024).

Preliminary research indicates that the duration of inpatient treatment for individuals diagnosed with schizophrenia is comparatively brief in developing countries, as compared to developed countries. The mean duration of hospitalization for patients diagnosed with schizophrenia in China was 73.3 ± 42.2 days. At the same time, in South Korea it was 78 ± 76 days, in Israel it ranges from 90 to 120 days, and in Tiongkok it is between 11 and 23 days. (Bian et al., 2019; Cheng et al., 2022; Hwang et al., 2020). A plethora of studies have been conducted by researchers in diverse samples, underscoring a variety of factors that potentially influence the duration of hospitalization in patients diagnosed with schizophrenia. Many studies are of a demographic or clinical nature and are classified into various categories. These include demographic variables, such as age, gender, marital status, employment status, ethnicity, and clinical variables, such as higher antipsychotic doses at discharge and the number of previous hospitalizations (Bruce & Smith, 2020; Noohi et al., 2020).

A multitude of factors have been identified as potentially influencing the length of stay of patients with mental disorders. These factors include sociodemographic, clinical, and healthcare system-related factors. In the context of schizophrenia, previous research has demonstrated that patient characteristics, including age, gender, marital status, and socioeconomic status, can influence treatment patterns and the duration of hospitalization (Koizumi et al., 2017; Velelekou et al., 2022). Furthermore, geographic factors, healthcare

infrastructure, and the specific clinical diagnosis and treatment complexity are determinants. While the primary focus is on schizophrenia, the presence of comorbidities or variations in diagnostic subtypes can influence the intensity and duration of treatment. Furthermore, the number of medical procedures or therapies administered during treatment (number of procedures) reflects the complexity of the case and may correlate with length of stay (Dimitri et al., 2018; Silva et al., 2020). Although many factors have been confirmed to be associated with the length of stay in schizophrenia patients across various countries and regions, to our knowledge, analogous studies are quite limited in Indonesia. The objective of this study is to ascertain the length of stay for patients diagnosed with schizophrenia in referral health facilities and the factors that influence it. The results of this study are expected to provide valuable information for policymakers, health service providers, and researchers to improve the quality of care for patients with schizophrenia in Indonesia.

Method

For a clearer understanding of the respondent selection process, Figure 1 Illustrates a flowchart outlining the stages of identification and screening based on the BPJS Health dataset.

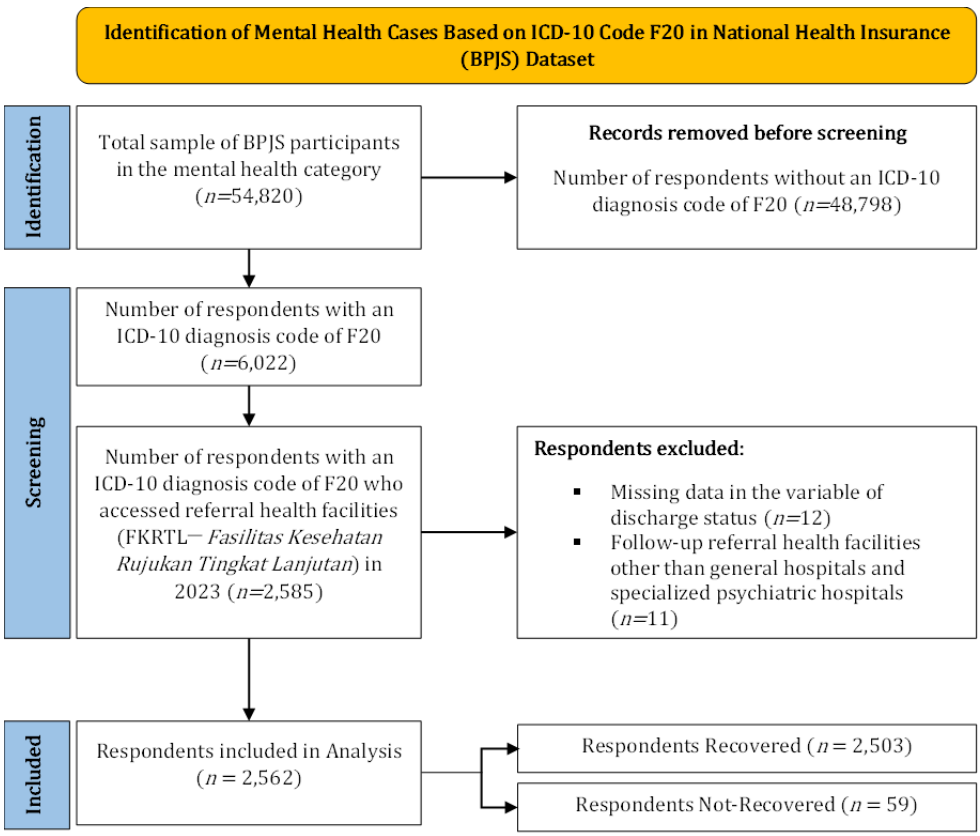

Figure 1. Flowchart identification of respondents

This research used secondary data from the Health Social Security Agency (BPJS Kesehatan), obtained via the official BPJS Health sample data portal at https://data.bpjs-kesehatan.go.id/bpjs-portal/action/blog.cbi?filter=data+sampel. As illustrated in Figure 1,

from a total of 54,820 records in the mental health category, 6,022 individuals were identified as having schizophrenia based on the ICD-10 diagnostic code F20. Of these, 2,585 patients received care at referral health facilities (FKRTL) in 2023. During data cleaning, 12 entries were removed due to incomplete information on discharge status (FKL14), and 11 were excluded because care was delivered outside general or psychiatric hospitals. After applying these criteria, 2,562 cases were eligible for analysis, comprising 2,503 individuals discharged in a recovered state and 59 who were classified as not recovered. The length of hospitalization in this study is defined as the clinical period required for patients with schizophrenia to achieve recovery, as evidenced by the dates of hospital admission and discharge, based on BPJS Kesehatan sample data.

The primary dependent variable, discharge status (FKL14), was dichotomized into "recovered" and "not recovered," with the latter including cases of death, referral to another facility, or discharge against medical advice. Gender (PSTV05) was categorized as male or female, while age group (PSTV03) was divided into four ranges: 0–14, 15–24, 25–59, and ≥ 60 years. Marital status (PSTV06) was coded as divorced, married, or never married. The BPJS Kesehatan classification (PSTV07) comprises Class 1, Class 2, and Class 3—respondent residence (PSTV14) distinguished between rural (district) and urban (city) areas. The type of primary healthcare facility (PSTV12) was categorized into public health centers (puskesmas) and primary clinics. The principal diagnosis (FKL16A) was grouped into ten categories: schizophrenia, paranoid, unspecified, undifferentiated, hebephrenic, catatonic, residual, post-schizophrenic depression, simple, and other forms. Case severity (FKL23) was classified as severe, moderate, or mild. The number of medical procedures (FKL30) was grouped into three levels: no procedures, one procedure, and two or more procedures. Hospitalization frequency in 2023 was determined from the number of FKRTL visits and categorized as first-time admission, single admission, or two or more admissions. Facility ownership (FKL08) was classified as either public or private, while the type of FKRTL (FKL09) distinguished between psychiatric and general hospitals. The proximity of the facility to the patient's place of residence was calculated using FKL06 and PSTV14 and classified as either within or outside the city/district. Length of stay was measured in days by calculating the interval between admission (FKL03) and discharge (FKL04) dates. All variables were systematically recoded and organized to facilitate statistical analysis.

All statistical analyses were conducted using R Studio. Survival analysis was used to examine time-to-event data, with the event of interest being the patient's discharge status from FKRTL. Kaplan-Meier estimators were employed to visualize the distribution of hospital stay durations, while the Cox proportional hazards model was applied to identify significant predictors influencing discharge outcomes.

Results

To provide a clearer understanding of the patient characteristics examined in this study, Table 1 presents the sociodemographic and clinical profiles of schizophrenia inpatients along with their corresponding mean length of stay. This table presents an

overview of how key variables—such as discharge status, gender, age group, marital status, BPJS Kesehatan class, residence, healthcare facility type, diagnosis categories, severity levels, procedure counts, admission frequency, and ownership status—are associated with differences in hospitalization duration.

Table 1. Sociodemographic and Clinical Characteristics of Schizophrenia Patients and Mean Length of Stay

Variable	n (%)	Mean Length of Stay (days) Mean (SD)	χ^2	p-value
Discharge Status				
Not Recovered	59 (2.3)	8.02 (13.5)	–	–
Recovered	2,503 (97.7)	20.1 (27.7)		
Gender				
Male	1,768 (69.0)	19.9 (27.3)	0.06	0.8072
Female	794 (31.0)	19.7 (28.0)		
Age Group				
0–14 years	13 (0.5)	20.2 (29.4)	0.81	0.8481
15–24 years	383 (14.9)	18.9 (24.5)		
25–59 years	1,984 (77.4)	20.0 (27.8)		
≥ 60 years	182 (7.1)	21.0 (30.3)		
Marital Status				
Divorced	152 (5.9)	20.0 (30.2)	4.13	0.1269
Married	899 (35.1)	21.3 (30.3)		
Never Married	1,511 (59.0)	19.0 (25.3)		
BPJS Kesehatan Class				
Class 3	2,116 (82.6)	19.8 (27.6)	5.72	0.0572
Class 2	217 (8.5)	17.1 (19.1)		
Class 1	229 (8.9)	22.6 (32.4)		
Residence				
Rural	872 (34.0)	19.9 (30.2)	1.24	0.2658
Urban	1,690 (66.0)	19.9 (26.0)		
Primary Healthcare Type				
Public Health Center	2,225 (86.9)	20.0 (27.3)	1.01	0.3151
Primary Clinic	337 (13.1)	19.1 (28.9)		
Diagnosis				
Schizophrenia	698 (27.2)	16.1 (20.5)	83.5	<0.0001
Paranoid	787 (30.7)	24.8 (34.1)		
Unspecified	453 (17.7)	20.8 (28.9)		
Undifferentiated	472 (18.4)	16.3 (21.4)		
Hebephrenic	94 (3.7)	20.6 (14.1)		
Catatonic	18 (0.7)	13.4 (6.33)		
Residual	17 (0.7)	30.5 (68.5)		
Post-schizophrenic Depression	7 (0.3)	10.4 (12.4)		
Simple	6 (0.2)	13.7 (4.23)		
Other	10 (0.4)	9.8 (5.47)		
Severity Level				
Severe	46 (1.8)	14.3 (8.87)	12.36	0.0021

Variable	n (%)	Mean Length of Stay (days) Mean (SD)	χ^2	p-value
Moderate	276 (10.9)	14.6 (17.0)		
Mild	2,240 (88.3)	20.6 (28.7)		
Procedure Count				
≥ 2 Procedures	1,103 (43.0)	16.6 (17.8)	82.5	<0.0001
1 Procedure	686 (26.8)	30.0 (43.8)		
No Procedure	773 (30.1)	15.5 (15.2)		
Inpatient Admission Frequency				
≥ 2 Admissions	195 (7.6)	18.3 (22.5)	53.57	<0.0001
1 Admission	853 (33.3)	17.1 (27.9)		
First Admission	1,514 (59.1)	21.6 (27.7)		
Ownership Status				
Private	206 (8.1)	8.95 (4.94)	190.84	<0.0001
Public	2,356 (91.9)	20.8 (28.4)		
Referral Facility Type				
Psychiatric Hospital	1,811 (70.7)	23.4 (30.9)	390.8	<0.0001
General Hospital	751 (29.3)	11.2 (13.1)		
Facility Location vs. Residence				
Outside City/District	1,649 (64.4)	21.6 (27.6)	65.7	<0.0001
Within City/District	913 (35.6)	16.6 (27.0)		

Table 1 Shows that the average length of stay among schizophrenia inpatients varied significantly across several characteristics. Patients discharged as recovered had a notably longer mean length of stay (20.1 days) than those who had not recovered (8.02 days). The longest stays were observed among patients treated at psychiatric hospitals, those with residual schizophrenia, and those undergoing one medical procedure, while shorter stays were associated with private hospitals, catatonic subtypes, and those with no procedures. Significant differences in length of stay were also observed across categories including diagnosis ($p < 0.0001$), severity level ($p = 0.0021$), procedure count, inpatient frequency, hospital ownership, facility type, and facility location (all $p < 0.0001$). Meanwhile, variables such as gender, age group, marital status, BPJS Kesehatan class, residential area, and primary healthcare type were not significantly associated with length of stay.

Figure 2 Illustrates three significant variables: diagnostic subtype, referral hospital type, and the referral facility's location relative to the patient's residence.

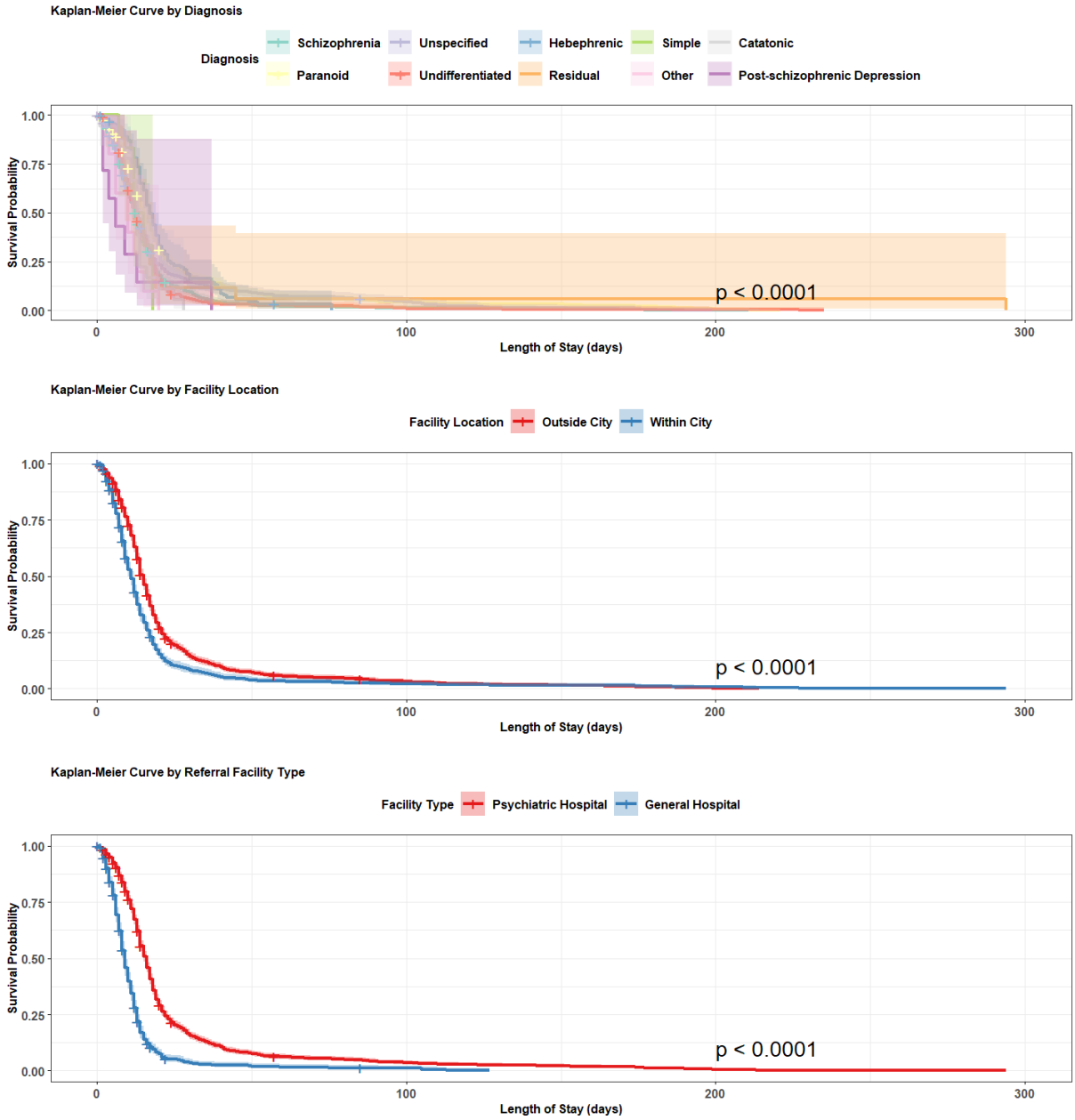

Figure 2. Kaplan–Meier survival curves illustrating the influence of three major clinical factors on the length of hospital stay in patients with schizophrenia.

Figure 2 illustrates three variables that showed significant associations with the length of stay among schizophrenia inpatients: diagnostic subtype, referral facility type, and the location of the facility relative to the patient's residence. The data indicate substantial variation in hospitalization duration across diagnostic categories, with the longest stays observed among patients with paranoid schizophrenia (mean 24.8 days) and residual schizophrenia (30.5 days), while catatonic, simple, and other rare subtypes had notably shorter stays. Referral facility type also demonstrated a strong influence, as patients treated in psychiatric hospitals experienced much longer average stays (23.4 days) compared to those admitted to general hospitals (11.2 days). Additionally, patients receiving treatment at facilities located outside their city or district had longer lengths of stay (21.6 days) than those treated within their own area (16.6 days). Overall, these findings

show that clinical diagnosis, service provider type, and geographic treatment significantly contribute to variations in hospitalization duration among individuals with schizophrenia.

Table 2 Presents the results of the Cox regression analysis used to identify factors associated with the likelihood of recovery among schizophrenia inpatients. In this survival analysis framework, the length of hospitalization was defined as the interval between admission and discharge at the referral facility. The "recovered" status was defined as the event, meaning that patients discharged in a recovered condition were considered to have experienced the event at the end of their recorded hospitalization. Patients who did not recover, including those who died, were referred to another facility, or were discharged against medical advice, and were treated as censored.

Table 2. Cox Regression Analysis of Factors Potentially Influencing Length of Stay Among Schizophrenia Inpatients

Variable	Category	HR (95% CI)	p-value
Gender	Male	ref.	–
	Female	1.01 (0.92–1.10)	0.907
Age Group	0–14 Years	ref.	–
	15–24 Years	1.60 (0.91–2.81)	0.1
	25–59 Years	1.48 (0.85–2.57)	0.17
	≥ 60 Years	1.60 (0.90–2.83)	0.111
Marital Status	Divorced	ref.	–
	Married	0.89 (0.75–1.06)	0.181
	Never Married	0.97 (0.81–1.16)	0.739
BPJS Kesehatan Class	Class 3	ref.	–
	Class 2	1.10 (0.95–1.28)	0.222
	Class 1	0.87 (0.75–1.02)	0.081
Residential Area	Rural	ref.	–
	Urban	0.88 (0.80–0.97)	0.007
Primary Healthcare Type	Public Health Center (ref)	ref.	–
	Primary Clinic	1.02 (0.90–1.16)	0.766
Diagnosis	Schizophrenia	ref.	–
	Paranoid	0.98 (0.87–1.10)	0.701
	Unspecified	1.01 (0.89–1.14)	0.896
	Undifferentiated	1.45 (1.27–1.65)	<0.001
	Hebephrenic	0.94 (0.75–1.19)	0.616
	Catatonic	1.70 (1.06–2.74)	0.029
	Residual	0.76 (0.46–1.26)	0.28
	Simple	1.19 (0.53–2.67)	0.675
	Other	1.28 (0.68–2.40)	0.444
	Post-schizophrenic Depression	1.08 (0.50–2.30)	0.847
Severity Level	Severe	ref.	–
	Moderate	1.03 (0.74–1.45)	0.844
	Mild	0.92 (0.67–1.26)	0.596
Procedure Count	≥ 2 Procedures	ref.	–
	1 Procedure	0.73 (0.66–0.81)	<0.001
	No Procedure	1.02 (0.93–1.13)	0.631
Inpatient Admission Frequency	≥ 2 Times	ref.	–

Variable	Category	HR (95% CI)	p-value
	1 Time	0.71 (0.55–0.93)	0.013
	First Time	0.98 (0.82–1.17)	0.839
Hospital Ownership	Private	ref.	–
	Public	0.57 (0.48–0.66)	<0.001
Referral Facility Type	Psychiatric Hospital (ref)	ref.	–
	General Hospital	2.31 (2.05–2.60)	<0.001
Facility Location from Residence	Outside City	ref.	–
	Within City	1.42 (1.04–1.95)	0.028

Table 2 shows that several variables were significantly associated with discharge status. Patients admitted to public hospitals had a 43% higher likelihood of recovery than those treated in private hospitals (HR = 0.57; $p < 0.001$). Similarly, individuals hospitalized in general hospitals were more than twice as likely to recover as those admitted to psychiatric hospitals (HR = 2.31; $p < 0.001$). Diagnostic subtype also played a critical role; patients with undifferentiated and catatonic schizophrenia exhibited significantly greater odds of recovery compared to those with the standard schizophrenia diagnosis (HR = 1.45 and HR = 1.70; $p < 0.001$ and $p = 0.029$, respectively). Additionally, patients who underwent a single medical procedure had a higher likelihood of recovery than those who underwent two or more procedures (HR = 0.73; $p < 0.001$). Patients with a history of one prior hospitalization had a significantly greater likelihood of recovery than those with two or more admissions (HR = 0.71; $p = 0.013$). Geographic factors also contributed: individuals residing in urban areas (HR = 0.88; $p = 0.007$) and those treated at facilities within their city or district (HR = 1.42; $p = 0.028$) were more likely to recover. In contrast, sociodemographic variables such as sex, age, marital status, BPJS class, residential area, and type of primary healthcare facility were not significantly associated with recovery status. These results underscore the greater influence of healthcare service factors and clinical characteristics over demographic factors in determining inpatient recovery outcomes for individuals with schizophrenia. A hazard function: $\lambda(t)=\lambda_0(t)\cdot\exp(\beta_1\cdot\text{Urban}+\beta_2\cdot\text{Undifferentiated}+\beta_3\cdot\text{Catatonic}+\beta_4\cdot\text{One Procedure}+\beta_5\cdot\text{One Admission}+\beta_6\cdot\text{Public Hospital}+\beta_7\cdot\text{General Hospital}+\beta_8\cdot\text{Within City})$.

Figure 3. Forest Plot Result of Cox Regression Model presents a forest plot summarizing the results of the Cox regression model for factors significantly associated with the recovery of schizophrenia inpatients. This visualization displays the hazard ratios along with their confidence intervals, providing a clear depiction of the magnitude and direction of each variable's influence on recovery time.

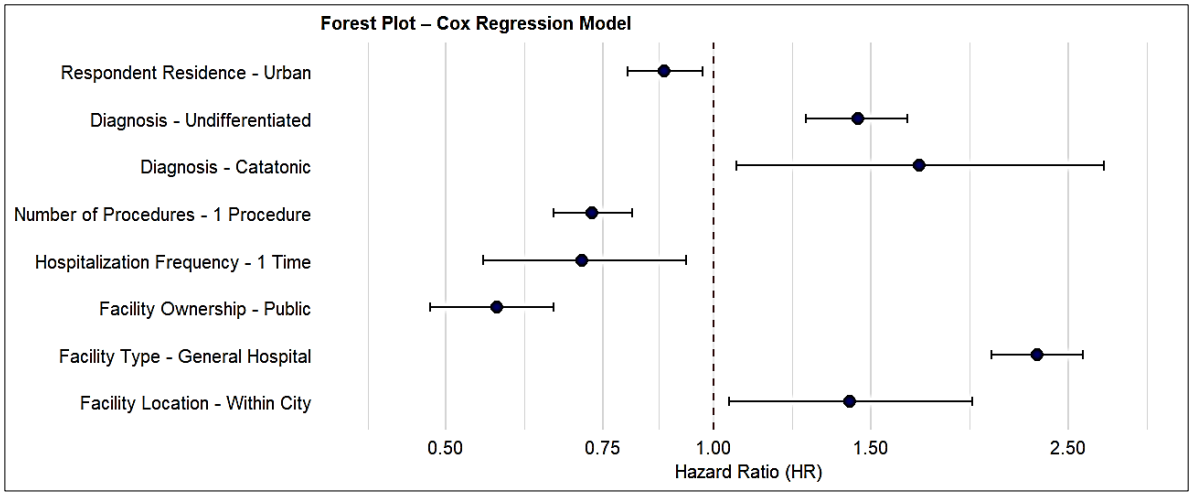

Figure 3. Forest Plot Result of Cox Regression Model

The forest plot (Figure 3) illustrates the factors influencing recovery among inpatients diagnosed with schizophrenia, as estimated by a Cox regression model. Points positioned above 1 indicate factors that increase the likelihood of recovery, whereas points below 1 represent factors that reduce the probability of recovery. The visualization demonstrates that several characteristics of healthcare services and clinical factors exert the strongest influence. Patients treated in public or general hospitals, or in facilities within their own city, as well as those residing in urban areas, tend to have higher probabilities of recovery. Clinically, individuals diagnosed with undifferentiated or catatonic schizophrenia also exhibit greater chances of recovery compared to those with a standard schizophrenia diagnosis. In addition, patients who underwent a single medical procedure and those with a history of a single hospitalization are more likely to recover than those with multiple procedures or repeated admissions. The results of this study explain that health service factors and clinical characteristics play a more determining role in determining recovery outcomes than sociodemographic variables, which did not show a significant relationship with recovery status among schizophrenia inpatients.

Discussion

Inpatient indicators are measures or standards used to assess inpatient services. One of the inpatient indicators is length of stay. Length of stay (LOS) is the average number of days an inpatient remains hospitalized. The efficiency standard of LOS is 3-12 days, and LOS is recommended to be as low as possible without affecting the quality-of-care services. (Rustiyanto, 2021) This finding shows that there are several factors influencing the length of stay of schizophrenia patients in referral health facilities, as listed below:

Factors that increase the risk of early discharge (HR>1)

Diagnosis- Undifferentiated; Diagnosis Catatonic

The finding shows that patients with undifferentiated and catatonic schizophrenia (HR = 1.45 and HR = 1.70; $p < 0.001$ and $p = 0.029$, respectively), which means patients with a diagnosis of catatonic schizophrenia have a 75% higher risk of early discharge and patients

with a diagnosis of undifferentiated schizophrenia have a 45% higher risk of early discharge. Catatonic features often respond well to specific interventions, including benzodiazepines and electroconvulsive therapy, potentially explaining the improved recovery rates.(Kline et al., 2022). Among patients diagnosed with schizophrenia, comorbid conditions pose aggravating factors, exerting a negative impact on disease courses, treatment adherence, and hospital length of stay (Burrer et al., 2024)

Facility Type-General Hospital

The finding that general hospitals demonstrate superior recovery outcomes compared to specialized psychiatric facilities (HR = 2.31; p < 0.001) is particularly noteworthy and challenges conventional assumptions about specialized care. Hospital length-of-stay limitations, such as the 28-day restriction commonly imposed to meet medical insurance requirements, may influence treatment outcomes.(Cheng et al., 2022b). General hospitals, particularly those with integrated mental health units, offer a more holistic approach to patient care, addressing not only psychiatric symptoms but also potential co-occurring physical health issues that can complicate schizophrenia and prolong hospitalization.(Johnson et al., 2022). Psychiatric hospitals, while specialized, might focus intensely on psychiatric stabilization, potentially leading to faster discharges for symptom control but perhaps less emphasis on broader functional recovery or management of comorbidities often present in this population. This finding underscores the importance of a comprehensive, integrated care model for schizophrenia patients. This suggests that the intensive, acute-care model in general hospitals may be more effective for certain patient populations, possibly due to comprehensive medical management or distinct treatment protocols.

Facility Location-Within City

Geographic factors also played a role, with individuals residing in urban areas (HR = 0.88; p = 0.007) and those treated at facilities located within their city or district (HR = 1.42; p = 0.028) demonstrating a higher likelihood of recovery. Urban areas often have better access to a wider range of mental health services, including outpatient clinics, rehabilitation programs, and social support networks, which are vital for sustained recovery and community reintegration.(Morgan C et al., 2014; Shimogai et al., 2019; Wallis et al., 2024). The benefit of receiving treatment close to home ("within their city or district") underscores the importance of accessible, localized care, which minimizes logistical barriers for patients and their families and facilitates ongoing engagement with treatment and support systems.(van Genk et al., 2023).

Factors that Lower the Risk of Discharge (Extending Hospitalization) (HR<1)

Respondent Residence-Urban

The geographic disparities in recovery outcomes, with urban patients exhibiting marginally lower recovery rates (HR = 0.88; p = 0.007), yet those treated locally demonstrating superior outcomes (HR = 1.42; p = 0.028), reveal a complex contradiction in schizophrenia treatment dynamics. Urban populations typically demonstrate higher socioeconomic status, but research indicates a 1.61-fold increased risk of schizophrenia

compared to rural populations. Urban backgrounds show significant associations with negative symptoms, contrasting with previous literature emphasizing positive psychotic symptoms(Allardyce et al., 2001).

The counterintuitive finding that urban patients exhibit poorer recovery outcomes despite superior healthcare access underscores the importance of treatment proximity over facility sophistication. Local treatment provision has been demonstrated in research to enhance family involvement, reduce treatment disruption, and improve care continuity. These factors have been identified as critical components of effective management of schizophrenia. This geographic treatment contradiction demonstrates that sociodemographic factors, healthcare accessibility, and treatment success interact in complex ways, emphasizing that optimal schizophrenia care requires consideration of both clinical and geographical determinants (Setiawati, 2020; Yang et al., 2022).

Number of Procedure-1 Procedure

The inverse relationship between the number of medical procedures and recovery outcomes (HR = 0.73 for single vs. multiple procedures) suggests that treatment complexity may be a marker of illness severity or treatment resistance. Patients requiring multiple interventions likely represent more complex cases with greater symptom severity or comorbidity burden, resulting in longer treatment courses and potentially reduced recovery rate (Berk et al., 2023; Mcintyre et al., n.d.). Multiple admissions often signify a more chronic or relapsing course of illness, potentially indicating challenges with medication adherence, social support, or access to continuous outpatient care.(Saha et al., 2005).

Hospitalization Frequency- 1 Time

The finding that patients with a single previous hospitalization have better recovery outcomes than those with multiple admissions (HR = 0.71; p = 0.013) is consistent with established literature on recurrent episodes in schizophrenia. Longer initial hospitalization predicts lower risk of schizophrenia relapse(Hareru et al., 2023) and early identification of individuals at highest risk for relapse in real-world treatment settings could help improve outcomes and reduce healthcare costs(Rivelli et al., 2021). This pattern suggests that repeated hospitalizations may indicate treatment-resistant illness or inadequate community support systems.

Facility Ownership-Public

The superior recovery rates observed in public hospitals compared to private facilities (HR = 0.57; p < 0.001) suggest potential differences in treatment approaches, resource allocation, or patient care models between these settings. According to recent inpatient treatment studies, 24.5% of patients were considered improved, 73.3% unchanged, and 2.2% deteriorated, with 56.6% discharged in a subclinical or mild functional state(Hansen et al., 2023). This variation in outcomes across hospital types may reflect differences in the availability of specialized care, multidisciplinary team approaches, or treatment duration policies. Public hospitals, particularly within referral health systems, often serve a broader and more complex patient population, including individuals with more severe illness and

limited financial resources. Their robust infrastructure, comprehensive multidisciplinary teams, and potentially longer-term rehabilitation programs might contribute to better recovery outcomes despite the initial severity of cases. Conversely, private hospitals, while offering personalized care, might have different discharge pressures or resource allocations that impact the overall length of stay and perceived recovery.

Conclusion

This research provides compelling evidence that healthcare service factors and clinical characteristics significantly outweigh demographic factors in determining recovery outcomes among patients with schizophrenia. The findings challenge conventional wisdom about psychiatric care delivery and highlight opportunities for healthcare system optimization. This finding supports universal healthcare access policies and underscores the critical importance of healthcare service quality, rather than patient characteristics, in determining outcomes.

References

Allam, S. (2024). Advancing Patient-Centered Care: A Nationwide Analysis of Hospital Efficiency and Morbidity Using Innovative Propensity Score Techniques. *Cureus*, *16*(12), e76370. https://doi.org/10.7759/cureus.76370

Anbasse, G. K., Tessema, W. G., Negash, A. T., & Alenko, A. A. (2024). Determinants of Disability Among Individuals Living with Schizophrenia Attending Psychiatric Follow-Up Clinic in Jimma, Southwest Ethiopia: An Institution-Based Case-Control Study. *Neuropsychiatric Disease and Treatment*, *20*(May), 1119–1130. https://doi.org/10.2147/NDT.S452866

Berk, M., Köhler-Forsberg, O., Turner, M., Penninx, B. W. J. H., Wrobel, A., Firth, J., Loughman, A., Reavley, N. J., Mcgrath, J. J., Momen, N. C., Plana-Ripoll, O., O'neil, A., Siskind, D., Williams, L. J., Carvalho, A. F., Schmaal, L., Walker, A. J., Dean, O., Walder, K., … Marx, W. (2023). Comorbidity between major depressive disorder and physical diseases: a comprehensive review of epidemiology, mechanisms, and management. In *World Psychiatry* (Vol. 22).

Bian, Y., Lin, C., Yang, F., Han, X., Zhang, J., Ma, B., Zhu, Y., & Wang, Z. (2019). The Optimal Length of Hospitalization for Functional Recovery of Schizophrenia Patients, a Real-World Study in Chinese People. *The Psychiatric Quarterly*, *90*(3), 661–670. https://doi.org/10.1007/s11126-019-09658-9

Bruce, M., & Smith, J. (2020). Length of stay among multi-ethnic psychiatric inpatients in the United Kingdom. *Comprehensive Psychiatry*, *102*, 152201. https://doi.org/https://doi.org/10.1016/j.comppsych.2020.152201

Burrer, A., Egger, S. T., Spiller, T. R., Kirschner, M., Homan, P., Seifritz, E., & Vetter, S. (2024). Examining the impact of substance use on hospital length of stay in schizophrenia spectrum disorder: a retrospective analysis. *BMC Medicine*, *22*, 1–9. https://doi.org/10.1186/s12916-024-03447-3

Cheng, P., Wang, L., Xu, L., Zhou, Y., Zhang, L., & Li, W. (2022). Factors Related to the Length of Stay for Patients with Schizophrenia: A Retrospective Study. *Frontiers in Psychiatry*, *12*. https://doi.org/10.3389/fpsyt.2021.818254

Dimitri, G., Giacco, D., Bauer, M., Bird, V. J., Greenberg, L., Lasalvia, A., Lorant, V., Moskalewicz, J., Nicaise, P., Pfennig, A., Ruggeri, M., Welbel, M., & Priebe, S. (2018). Predictors of length of stay in psychiatric inpatient units: Does their effect vary across countries? *European*

Psychiatry: The Journal of the Association of European Psychiatrists, *48*, 6–12. https://doi.org/10.1016/j.eurpsy.2017.11.001

Hansen, H. G., Starzer, M., & Nilsson, S. F. (2023). Clinical Recovery and Long-Term Association of Specialized Early Intervention Services vs Treatment as Usual Among Individuals with First-Episode Schizophrenia Spectrum Disorder. *JAMA Psychiatry*, *80*(4), 371–379. https://doi.org/10.1001/jamapsychiatry.2022.5164

Hareru, H. E., Gezae, K. E., W/tsadik, D. S., & Gebregergs, G. B. (2023). Time to Relapse and Relapse Predictors in Patients with Schizophrenia at Ayder Comprehensive Specialized Hospital, Northern Ethiopia. *Mental Illness*, *2023*(1), 6230063. https://doi.org/10.1155/2023/6230063

Harvey, P. D., & Strassnig, M. T. (2019). Cognition and disability in schizophrenia: cognition-related skills deficits and decision-making challenges add to morbidity. *World Psychiatry: Official Journal of the World Psychiatric Association (WPA)*, *18*(2), 165–167. https://doi.org/10.1002/wps.20647

Hwang, T.-Y., Jung, G., Lee, C.-J., & Kim, H.-Y. (2020). Analysis of involuntary admissions in Korea through the admission management information system. *International Journal of Law and Psychiatry*, *68*, 101542. https://doi.org/https://doi.org/10.1016/j.ijlp.2020.101542

Johnson, S., Dalton-Locke, C., Baker, J., Hanlon, C., Salisbury, T. T., Fossey, M., Newbigging, K., Carr, S. E., Hensel, J., Carrà, G., Hepp, U., Caneo, C., Needle, J. J., & Lloyd-Evans, B. (2022). Forum-Acute Psychiatric Care: Increasing The Range of Services And Improving Their Effectiveness And Acceptability. Acute psychiatric care: approaches to increasing the range of services and improving access and quality of care. In *World Psychiatry* (Vol. 21, Issue 2).

Kemenkes RI. (2023). *Survei Kesehatan Indonesia (SKI) 2023*.

Kline, C. L., Suzuki, T., Simmonite, M., & Taylor, S. F. (2022). *Catatonia is associated with higher rates of negative affect amongst patients with schizophrenia and schizoaffective disorder*.

Koizumi, F., Otsuka, K., Endo, J., Hinta, E., Sato, H., Nakamura, H., & Sakai, A. (2017). Predictors for the length of stay of emergency psychiatric patients. *JIMA*, *69*(3), 125–136.

Noohi, S., Kalantari, S., Hasanvandi, S., & Elikaei, M. (2020). Determinants of Length of Stay in a Psychiatric Ward: a Retrospective Chart Review. *The Psychiatric Quarterly*, *91*(2), 273–287. https://doi.org/10.1007/s11126-019-09699-0

Pedersen, C. B., Antonsen, S., Timmermann, A., Pedersen, M. G., Ejlskov, L., Horsdal, H. T., Agerbo, E., Webb, R. T., Raaschou-Nielsen, O., Sigsgaard, T., Sabel, C. E., Fan, C. C., & Thompson, W. K. (2022). Urban-Rural Differences in Schizophrenia Risk: Multilevel Survival Analyses of Individual- and Neighborhood-Level Indicators, Urbanicity and Population Density in a Danish National Cohort Study. *Schizophrenia Bulletin Open*, *3*(1). https://doi.org/10.1093/SCHIZBULLOPEN/SGAB056

Rantala, M. J., Luoto, S., Borráz-León, J. I., & Krams, I. (2022). Schizophrenia: The new etiological synthesis. *Neuroscience & Biobehavioral Reviews*, *142*, 104894. https://doi.org/https://doi.org/10.1016/j.neubiorev.2022.104894

Rivelli, A., Fitzpatrick, V., Nelson, M., Laubmeier, K., Zeni, C., & Mylavarapu, S. (2021). Real-World Predictors of Relapse in Patients with Schizophrenia and Schizoaffective Disorder in a Large Health System. *Schizophrenia*, *10*(28), 1–11. https://doi.org/10.1038/s41537-024-00448-2

Rustiyanto, E. (2021). *Sistem Pelaporan Rumah Sakit*. Gadjah Mada University Press.

Setiawati, N. M. (2020). Differences in Sociodemographic Characteristics of Schizophrenia Patients between Rural and Urban Areas in Badung Regency. *WMJ (Warmadewa Medical Journal)*, *5*(2), 76–84. https://doi.org/10.22225/wmj.5.2.1831.76-84

Shimogai, T., Izawa, K. P., Kawada, M., & Kuriyama, A. (2019). Factors affecting discharge to home of medical patients treated in an intensive care unit. *International Journal of Environmental Research and Public Health*, *16*(22). https://doi.org/10.3390/ijerph16224324

Silva, M., Antunes, A., Loureiro, A., Azeredo-Lopes, S., Saraceno, B., Caldas-de-Almeida, J. M., & Cardoso, G. (2020). Factors associated with length of stay and readmission in acute psychiatric inpatient services in Portugal. *Psychiatry Research*, 293, 113420. https://doi.org/10.1016/j.psychres.2020.113420

van Genk, C., Roeg, D., van Vugt, M., van Weeghel, J., & Van Regenmortel, T. (2023). Current insights of community mental healthcare for people with severe mental illness: A scoping review. *Frontiers in Psychiatry*, *14*, 1156235. https://doi.org/10.3389/FPSYT.2023.1156235

Velelekou, A., Papathanasiou, I. V., Alikari, V., Papagiannis, D., Tsaras, K., & Fradelos, E. C. (2022). Factors influencing the duration of hospitalization of patients with schizophrenia. *Medicine and Pharmacy Reports*, *95*(3), 290–299. https://doi.org/10.15386/mpr-2144

Wallis, J. A., Shepperd, S., Makela, P., Han, J. X., Tripp, E. M., Gearon, E., Disher, G., Buchbinder, R., & O'Connor, D. (2024). Factors influencing the implementation of early discharge hospital at home and admission avoidance hospital at home: a qualitative evidence synthesis. In *Cochrane Database of Systematic Reviews* (Vol. 2024, Issue 3). John Wiley and Sons Ltd. https://doi.org/10.1002/14651858.CD014765.pub2

Yang, L. H., Phillips, M. R., Li, X., Yu, G., Grivel, M. M., Zhang, J., Shi, Q., Ding, Z., Pang, S., & Susser, E. (2022). Determinants of never-treated status in rural versus urban contexts for individuals with schizophrenia in a population-based study in China. *BMC Psychiatry*, 22(1). https://doi.org/10.1186/s12888-021-03651-y