



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

COVID-19 and the Transformation of Mental Health Service Delivery: A Cross-Sectional Survey of Private Tertiary-Care Hospitals in India's National Capital Region

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Abstract

Background: Mental health has long suffered from lack of prominence compared to physical health in India, compounded by sociocultural stigma, inadequate infrastructure, and chronic underfunding. The COVID-19 pandemic redirected attention toward mental health within tertiary-care hospitals managing simultaneous physical crises. This study examines the extent to which the COVID-19 pandemic influenced the adoption, implementation, and perceived effectiveness of mental health support services in private tertiary-care hospitals in India's National Capital Region (NCR).

Methods: A descriptive, cross-sectional study was conducted across 43 private tertiary-care hospitals in Delhi-NCR between January and June 2024. Primary data were analysed from 380 healthcare professionals (doctors, nurses, administrators) using a structured 24-item questionnaire to assess mental health service delivery before, during, and after the pandemic. Statistical analyses included independent-samples *t*-tests, one-way ANOVA, Kruskal-Wallis non-parametric sensitivity tests, and multivariable logistic regression.

Results: Among 380 respondents (51.3% male, 48.7% female), 57.4% reported simultaneous operation of helplines, counselling, and online helpdesks during the pandemic. Post-pandemic, 84% rated adoption as moderate or above, and 81% rated perceived effectiveness as effective or higher. No statistically significant differences were observed by gender ($t = 0.711$, $p = 0.477$), age group ($F = 1.775$, $p = 0.152$), or experience level ($F = 0.531$, $p = 0.589$). Multivariable logistic regression confirmed that demographic characteristics were not significant independent predictors of perceived effectiveness (Nagelkerke $R^2 = 0.02$).

Conclusions: The study documents sustained post-pandemic integration of mental health services in private tertiary-care hospitals within India's most resource-dense urban centre, supported by technology-driven solutions, legislative reforms, and programmes such as Tele-MANAS. These findings represent provider perceptions at a single point in time and do not establish causal relationships between the COVID-19 pandemic and observed changes. The results highlight accelerated digital integration in high-resource urban private settings, which simultaneously underscores a stark structural gap for the public sector and rural India where the majority of the population seeks care.

Keywords: Digital health; Health systems strengthening; Healthcare administration; Mental health integration; Post-pandemic healthcare; Telepsychiatry

1. INTRODUCTION

The COVID-19 pandemic accelerated the adoption of telepsychiatry, digital mental health interventions, and remote counselling services across healthcare systems worldwide. In India, these developments increased attention toward mental health service delivery within tertiary-care hospitals and highlighted longstanding gaps in access, workforce capacity, and infrastructure. Despite this momentum, significant structural challenges persist especially in high-volume tertiary-care hospitals in metropolitan areas such as Delhi-NCR, where constrained physician-patient ratios and overburdened infrastructure struggle to absorb a surging caseload. Simultaneously, smaller cities and rural India continue to grapple with entrenched stigma and taboo perceptions of mental illness, compounding the challenge of universal mental healthcare delivery (Ghosh et al., 2021).

Prior to the pandemic, mental health occupied a peripheral position in India's clinical and policy priorities. The maiden National Mental Health Survey (NMHS-1, 2015–16) estimated that nearly 14% of India's population suffered from a mental health disorder, yet only 10% received evidence-based treatment a treatment gap exceeding 70% (Gururaj et al., 2016). The pandemic triggered an unprecedented recognition of this deficit, prompting legislative reinforcement, digital innovation, and public health programming at scale (Sharma et al., 2021; Moreno et al., 2020).

1.1 Global Mental Health Landscape Post-COVID-19

The World Health Organisation's scientific brief (March 2022) confirmed a 25% global rise in anxiety and depression prevalence attributable to the pandemic (Spoorthy et al., 2020). The Global Burden of Disease (GBD) 2021 report revealed a disproportionate impact on women and young people, with the latter particularly vulnerable to suicidal and self-harming behaviours. Persons with pre-existing comorbidities including cancer, cardiovascular disease, and asthma faced an elevated risk of developing co-occurring mental health disorders (Patel et al., 2022; Sagar et al., 2020). Mental healthcare services were identified as among the most disrupted essential health services during the pandemic, with WHO reporting major interruptions even in suicide prevention programmes across member states. Approximately 90% of countries surveyed integrated mental health and psychosocial support into their COVID-19 response plans. The WHO's World Mental Health Report 2025 confirmed that nearly 1.1 billion people roughly one in seven globally live with a mental disorder, now identified as a leading cause of disability (Appleton et al., 2021). Despite this, the WHO Mental Health Atlas 2020 has highlighted persistent global shortages in mental health resources: government financing for mental healthcare has remained stagnant at approximately 2% of national health budgets over the past decade, and many low-income countries still report fewer than one mental health professional per 100,000 people (Srivastava et al., 2022).

1.2 Indian Context: Historical Deficits and Pandemic Triggers

India's mental health policy trajectory began with the National Mental Health Programme (NMHP) in 1982; however, implementation remained fragmented and under-resourced. The NMHS-1 (2015–16) documented a substantial treatment gap in mental healthcare, whereas the NMHS-2, completed in 2025 following a nine-year interval, represents the first national post-pandemic assessment of mental health and is expected to provide updated evidence for policy formulation and resource planning (Garg et al., 2024; Patel et al., 2023; Murthy et al., 2017). Key structural challenges include: sociocultural stigma that discourages help-seeking (with 83–90% of patients in India receiving no formal care); a critical shortage of psychiatrists (0.3 per 100,000, against a WHO minimum of 3 per 100,000); inadequate rural infrastructure; poor integration of mental health into primary care; and the allocation of less than 1% of India's total health budget to mental health. Rapid urbanisation, deteriorating family structures, poverty, and gender inequality further amplify the burden (Nigam et al., 2024).

1.3 Policy and Institutional Responses

Post-pandemic India has enacted several important policy and institutional measures: the Mental Healthcare Act (MHCA), 2017 established a rights-based framework for mental healthcare in India, which defined patients' rights and decriminalised suicide attempts; the Rights of Persons with Disabilities (RPwD) Act 2016, which included mental illness within the definition of disability; the National Health Policy 2017, which recognised mental health as a national priority; and the National Suicide Prevention Strategy (NSPS) 2022, which set a target of reducing suicide deaths by 10% by 2030. Tele-MANAS has emerged as a key component of India's digital mental health infrastructure, providing free, 24-hour tele-counselling services in multiple languages and expanding access to mental healthcare across diverse populations (Ransing et al., 2020). According to official government reports, Tele-MANAS has expanded to 53 centres across 36 States and Union Territories and has handled approximately three million calls since its launch. While these figures indicate substantial utilisation and nationwide reach, service volume alone does not provide evidence regarding quality of care or long-term mental health outcomes, which require further systematic evaluation (Ariadi et al., 2017; Naslund et al., 2017). In June 2025, Tele-MANAS incorporated a Video Consultation feature to enable expert escalation from the helpline, a model that has been recognised by the WHO as an innovative approach to digital mental healthcare delivery. The Insurance Regulatory and Development Authority of India (IRDAI) mandated parity between mental and physical health insurance coverage (Singh et al., 2022).

This study examines the extent to which the COVID-19 pandemic influenced the adoption, implementation, and perceived effectiveness of mental health support services in India's private tertiary-care hospitals. Particular emphasis is placed on understanding whether pandemic-driven innovations, including telepsychiatry, counselling services, and digital support platforms, have remained integrated into routine healthcare delivery in the post-pandemic period. The study presents primary research across 43 private NCR hospitals, supported by national and international secondary sources, and concludes with a forward-looking analysis of emerging trends in mental healthcare in India (Kola et al., 2021; Semrau et al., 2016).

Although previous studies have documented the expansion of telepsychiatry and digital mental health services during the COVID-19 pandemic, several important gaps remain. Most available research has focused on service utilisation during the acute pandemic period rather than the long-term sustainability of these interventions. Furthermore, limited evidence is available regarding healthcare professionals' perceptions of post-pandemic service integration within tertiary-care hospitals in India. Existing studies have also largely emphasised service availability rather than adoption, and equitable engagement. The present study seeks to address these gaps through primary data collected from healthcare professionals across private tertiary-care hospitals in the National Capital Region.

2. MATERIALS AND METHODS

2.1 Study Design

This study employs a descriptive, cross-sectional, non-randomised research design to assess the impact of the COVID-19 pandemic on the adoption and delivery of mental health services in private tertiary-care hospitals. The descriptive design enables detailed documentation of the current state of mental health service delivery, while the cross-sectional structure allows simultaneous capture of pre-, during-, and post-pandemic experiences through retrospective reporting by healthcare professionals (Thara et al., 2010).

2.2 Study Setting and Population

The study was conducted across 43 private tertiary-care hospitals in the National Capital Region (NCR) of India, encompassing Delhi and its satellite cities (Gurugram, Noida, Faridabad, and Ghaziabad). These hospitals were selected on the basis of having dedicated psychiatry departments, a minimum bed strength of 100, and functional mental health service units. The target population comprised healthcare professionals including doctors, nurses, and administrators who had been employed in these hospitals

across all three phases: pre-pandemic (until 2019), during the pandemic (2020–2021), and post-pandemic (2022 onwards).

Sampling Method: Hospitals were selected using purposive sampling based on three criteria: (a) dedicated psychiatry department, (b) minimum 100 beds, and (c) functional mental health service units. Healthcare professionals within selected hospitals were recruited using stratified convenience sampling to ensure representation across professional roles (doctors, nurses, administrators). Participation was voluntary, and no incentives were provided.

2.3 Sample and Data Collection

A total of 380 respondents participated in the study. Data were collected through structured questionnaires and personal interviews, administered between January 2024 and June 2024. Demographic data captured included gender, age group, professional role, and years of experience. Substantive questions focused on: (a) types of mental health services offered in these hospitals before, during, and after the pandemic; (b) degree of adoption improvement observed; (c) operations of services post-pandemic; and (d) key barriers to adoption. All responses were recorded on a 5-point Likert-type scale for quantitative variables, and categorical data were analysed for service-type variables (Sagar et al., 2020).

The questionnaire was developed following a comprehensive review of published literature on post-pandemic mental health service delivery, telepsychiatry, digital mental health platforms, and healthcare service integration. The draft instrument was evaluated by experts in hospital administration and mental health to establish content validity. Necessary modifications were incorporated based on expert feedback, and a pilot study was conducted to assess clarity, relevance, and comprehensibility before administration to the study participants.

2.3.1 Instrument Validation

The structured questionnaire comprised 24 items measured on a 5-point Likert-type scale (1 = Strongly Disagree to 5 = Strongly Agree). Internal consistency was assessed using Cronbach's alpha, which yielded a value of 0.82, indicating acceptable reliability. The instrument was adapted from published scales on digital health adoption and healthcare service integration (Appleton et al., 2021; Torous et al., 2021), with modifications to reflect the Indian tertiary-care context. The instrument was pilot-tested among 30 healthcare professionals (not included in the final sample) to ensure clarity and comprehension.

2.3.2 Outcome Measures

To assess the extent of post-pandemic transformation in mental health service delivery, four descriptive indicators were examined: (i) implementation of multiple mental health support services, (ii) adoption of mental health support interventions, (iii) perceived operations of services, and (iv) equitable engagement across demographic groups. These indicators were analysed independently and interpreted collectively to provide an overall assessment of changes in mental health service delivery. No validated composite psychometric index was constructed.

2.4 Statistical Analysis

Data were analysed using SPSS (v26). Frequency distribution analysis summarised demographic characteristics and categorical variables. Descriptive statistics (mean, standard deviation, range) were computed for key constructs. Normality was assessed using the Shapiro-Wilk test, and homogeneity of variance was confirmed using Levene's test. Gender differences were assessed using independent-samples *t*-tests, while age-group and experience-level variations were evaluated using one-way ANOVA. Effect sizes were reported as eta-squared (η^2) for ANOVA and Cohen's *d* for *t*-tests. The significance threshold was set at $p < 0.05$.

Given the ordinal nature of Likert-scale data, non-parametric sensitivity analyses were conducted using Kruskal-Wallis *H* tests to validate parametric findings. The Mann-Whitney *U* test was used as a non-parametric alternative to the independent-samples *t*-test for gender comparisons. These analyses confirmed the robustness of parametric results.

2.4.1 Multivariable Analysis

In addition to descriptive and bivariate analyses, multivariable logistic regression analysis was performed to examine whether demographic characteristics independently predicted respondents' perceptions of mental health service effectiveness. The dependent variable was dichotomised into positive perception (Effective, Highly Effective, and Most Effective) and lower perception (Not Effective and Moderately Effective), based on the theoretical threshold where ratings of 4 or 5 on the 5-point scale represent affirmative endorsement of service quality. Independent variables included gender, age group, and professional experience. Adjusted odds ratios (AORs) with 95% confidence intervals (CI) were calculated. Statistical significance was considered at $p < 0.05$.

2.5 Analytical Approach

Given the cross-sectional, retrospective design, the study employed descriptive and comparative analyses to characterise changes in service delivery across three periods (pre-pandemic, during pandemic, post-pandemic). No causal inferences were drawn. This study was reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cross-sectional studies.

2.6 Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of Shri Guru Ram Rai University (Approval No: ____). All participants provided written informed consent prior to questionnaire administration. Participation was voluntary, and respondents could withdraw at any time without penalty. Responses were collected anonymously, and confidentiality was maintained throughout the study. The collected information was used exclusively for research purposes.

2.7 Prior Permissions and Administrative Approval

Administrative permission was obtained from the management of all participating private tertiary-care hospitals before commencement of the study. Written informed consent was obtained from all participants before questionnaire administration. Participation was voluntary, responses were collected anonymously, and confidentiality was maintained throughout the study.

3. RESULTS

The findings of the study are presented in this section based on responses obtained from 380 healthcare professionals across 43 private tertiary-care hospitals in the National Capital Region (NCR) of India. The results encompass respondents' demographic characteristics, the nature and extent of mental health services provided during the COVID-19 pandemic, post-pandemic adoption of these services, perceived implementation barriers, and statistical comparisons across demographic groups. The analyses were undertaken to evaluate patterns of mental health service delivery and to examine the extent of transformation in mental healthcare practices following the pandemic. The results primarily reflect healthcare professionals' perceptions regarding adoption, implementation, and operations of mental health services. No objective patient-level clinical outcomes (e.g., symptom reduction, treatment adherence, hospitalisation rates, or recovery measures) were assessed in the present study.

3.1 Demographic Profile of Respondents

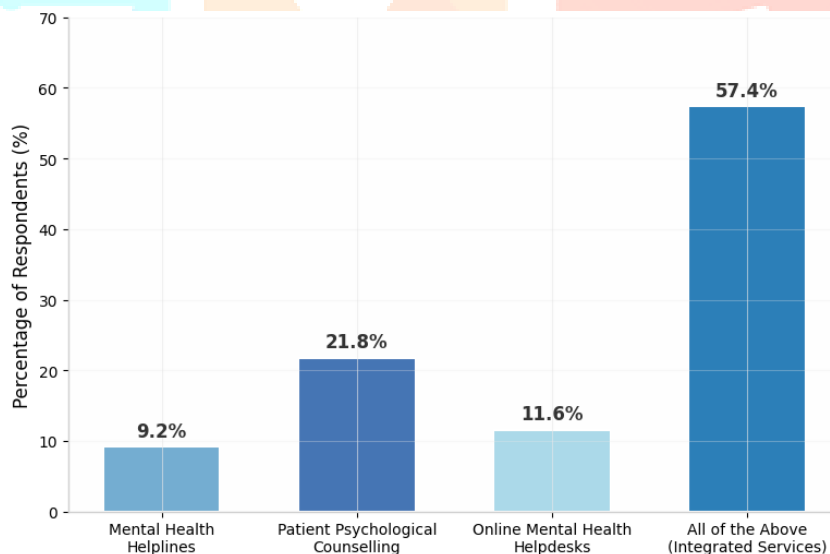
Table 1 presents the demographic characteristics of the study participants. Among the 380 respondents, 195 (51.3%) were male and 185 (48.7%) were female, indicating a relatively balanced gender distribution. The largest age group was 21–30 years (32.9%), followed by 31–40 years (29.5%), while respondents aged above 50 years constituted the smallest proportion (16.6%). With respect to professional experience, 157 respondents (41.3%) reported more than 10 years of experience, 147 (38.7%) had less than five years of experience, and 76 (20.0%) had between six and 10 years of experience. Overall, the sample comprised healthcare professionals with diverse age and experience profiles, providing a broad representation of perspectives regarding mental health service delivery in private tertiary-care hospitals.

Table 1. Demographic Characteristics of Respondents (n = 380)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	195	51.3
	Female	185	48.7
Age Group (Years)	21–30	125	32.9
	31–40	112	29.5
	41–50	80	21.1
	>50	63	16.6
Experience Level	<5 Years	147	38.7
	6–10 Years	76	20.0
	>10 Years	157	41.3

3.2 Mental Health Services Provided During the Pandemic

Figure 1 presents the distribution of respondents by the types of mental health support services provided in their hospitals during the pandemic. A majority (57.4%) reported that all major service categories mental health helplines, patient psychological counselling, and online mental health helpdesks were operational simultaneously. Patient psychological counselling was the second most commonly cited standalone service (21.8%), followed by online mental health helpdesks (11.6%) and telephone-based helplines (9.2%). These findings indicate a rapid, multi-modal expansion of mental health services during the pandemic period.



Note: Percentages reflect proportion of respondents indicating each service category; "All of the Above" indicates hospitals providing all three services concurrently.

Figure 1. distribution of Mental Health support Services Provided in Private Tertiary-Care hospitals During the COVID-19 Pandemic

More than half of respondents reported simultaneous implementation of helplines, counselling services, and online helpdesks, suggesting a perceived transition from fragmented mental health services to more integrated care delivery models during the pandemic period. Because these findings are based on respondent reports rather than institutional audits, they should be interpreted as perceptions of service implementation.

3.3 Post-Pandemic Improvement in Adoption

Respondents were asked to rate the degree to which the adoption of mental health services had improved due to the pandemic. As shown in Figure 2, 51% rated improvement as 'Moderate', while 16% rated it 'Widespread' and 17% 'Complete' together accounting for 84% rating adoption at moderate or above. Only 8% each rated it as 'Minimal' or 'Limited', indicating that most respondents perceived substantial and sustained improvement in mental health service adoption following the pandemic.

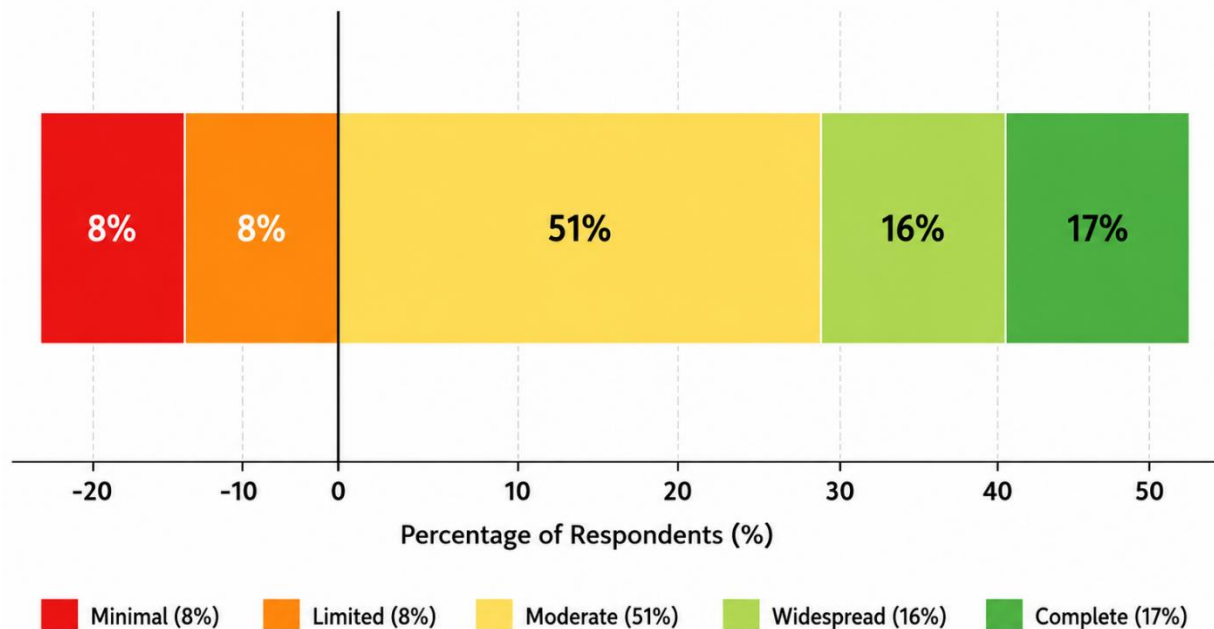


Figure 2. Healthcare professionals' perceptions of post-pandemic improvement in the adoption of mental health support services in private tertiary-care hospitals (n = 380).

3.4 Effective Operations of Mental Health Services Post-Pandemic

Figure 3 summarises respondents' perceptions of mental health services in the post-pandemic period. A combined 81% rated services as 'Effective' (46%), 'Highly Effective' (19%), or 'Most Effective' (16%). Only 9% rated services as 'Not Effective', while 10% rated them 'Moderately Effective'. These results indicate that respondents generally perceived post-pandemic mental health services as effective. However, these findings reflect subjective assessments of services and should not be interpreted as evidence of actual clinical effectiveness or improved patient outcomes.

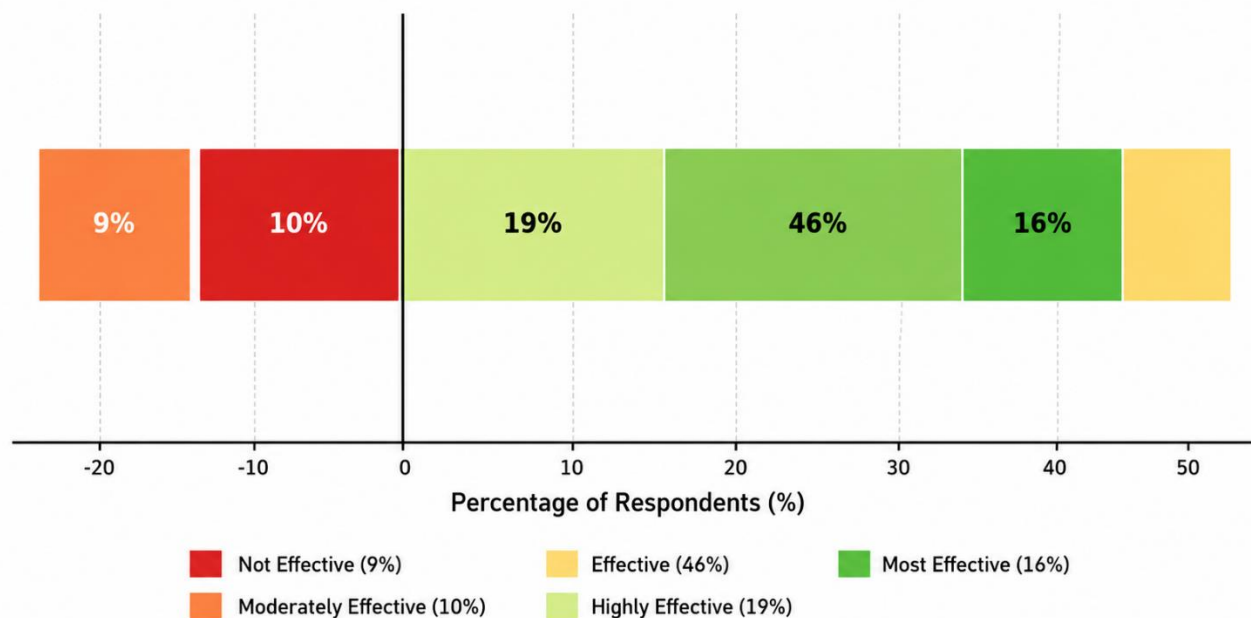


Figure 3. Perceived operational effectiveness of mental health support services in the post-pandemic period among healthcare professionals in private tertiary-care hospitals (n = 380).

3.5 Barriers to Adoption

Figure 4 presents the key barriers to mental health service adoption as perceived by respondents. The most frequently identified response was 'All of the Above' (27.1%), indicating that a significant cohort experiences all barrier types simultaneously. Among identified specific barriers: limited awareness and misinformation (23.9%) ranked highest, followed by overburdened healthcare systems (17.4%), shortage

of mental health professionals (16.6%), and high cost with limited insurance coverage (15.0%). The compounded nature of these barriers underscores the multi-dimensional challenge of achieving universal mental health service delivery. Limited awareness and misinformation emerged as the most important individual barrier, while more than one-quarter of respondents experienced multiple barriers simultaneously, highlighting the complexity of mental healthcare implementation challenges.

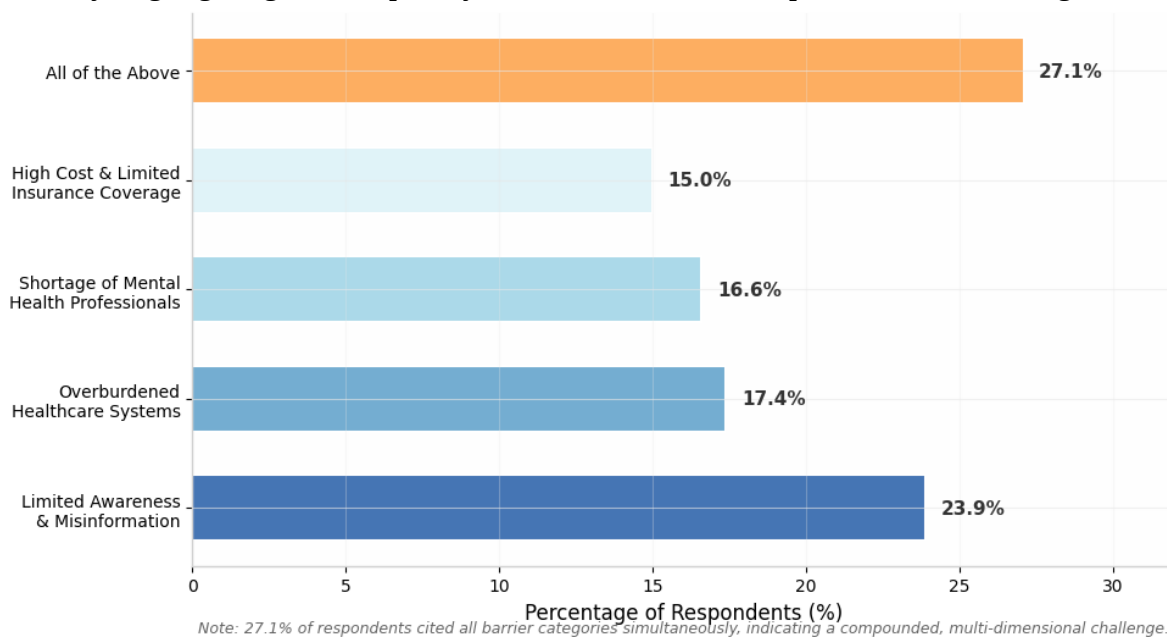


Figure 4. Perceived barriers to the adoption and implementation of mental health services in private tertiary-care hospitals (n = 380).

3.6 Indicators of Post-Pandemic Mental Health Service Integration

The results indicate substantial integration of mental health support services following the COVID-19 pandemic. More than half of the respondents reported implementation of multiple mental health support services (57.4%), while 84% reported moderate-to-complete adoption of such services. Furthermore, 81% perceived these interventions as effective or highly effective. No statistically significant differences were observed across gender, age, or experience groups; however, the absence of statistically significant differences should not be interpreted as evidence of equivalence because formal equivalence testing and statistical power analyses were not performed.

Table 2. Composite Indicators of Mental Health Service Integration

Indicator	Positive Response (%)
Multi-service implementation	57.4
Moderate-to-complete adoption	84
Effective-to-most effective services	81
No statistically significant demographic differences observed	$p > 0.05$ across gender, age, and experience groups

3.7 Statistical Test Results

Prior to inferential analyses, statistical assumptions were evaluated. Shapiro-Wilk tests indicated no significant departures from normality ($p > 0.05$), and Levene's test confirmed homogeneity of variances across comparison groups ($p > 0.05$). Therefore, independent-samples t -tests and one-way ANOVA were considered appropriate for subsequent analyses. Table 3 presents the results of the independent-samples t -test examining gender differences in mental health support scores. No statistically significant difference was observed between male (3.30 ± 1.01) and female (3.23 ± 0.86) respondents ($t = 0.711$, $p = 0.477$), indicating no statistically significant difference in mean mental health support scores between male and female respondents.

Table 3. Independent-Samples *t*-Test: Gender Differences in Mental Health Support Score (*n* = 380)

Variable	Male (<i>n</i> = 195) Mean ± SD	Female (<i>n</i> = 185) Mean ± SD	<i>t</i> - value	<i>p</i> - value	Mean Difference	95% CI
Mental Health Support Score	3.30 ± 1.01	3.23 ± 0.86	0.711	0.477	0.07	−0.12, 0.26

Note: The effect size was small (Cohen's $d = 0.08$), suggesting minimal practical difference between groups. The 95% confidence interval for the mean difference ranged from −0.12 to 0.26.

Table 4 presents mental health support scores across different age groups. Mean scores were broadly comparable, ranging from 3.02 ± 0.83 among respondents aged above 50 years to 3.33 ± 0.86 among those aged 31–40 years. One-way ANOVA indicated that the observed differences were not statistically significant ($F = 1.775$, $p = 0.152$). The effect size was small ($\eta^2 = 0.014$), indicating that age group explained only a limited proportion of variance in mental health support scores.

Table 4. One-Way ANOVA: Age-Group Differences in Mental Health Support Score (*n* = 380)

Age Group (Years)	<i>n</i>	Mean ± SD	95% CI
21–30	125	3.29 ± 0.97	3.12–3.46
31–40	112	3.33 ± 0.86	3.17–3.49
41–50	80	3.32 ± 1.06	3.09–3.55
>50	63	3.02 ± 0.83	2.81–3.23

Note: One-way ANOVA revealed no statistically significant differences in mental health support scores among age groups ($F = 1.775$, $p = 0.152$). The effect size was small ($\eta^2 = 0.014$), indicating that age explained approximately 1.4% of the variance in mental health support scores.

Table 5 presents mental health support scores according to respondents' professional experience. Mean scores were comparable across all experience categories, ranging from 3.18 ± 0.90 to 3.32 ± 0.95 . One-way ANOVA revealed no statistically significant differences between groups ($F = 0.531$, $p = 0.589$), indicating that no statistically significant differences in mental health support scores were detected across experience levels. The effect size was negligible ($\eta^2 = 0.003$), indicating that experience level explained very little variance in mental health support scores.

Table 5. One-Way ANOVA: Experience-Level Differences in Mental Health Support Score (*n* = 380)

Experience Level	<i>n</i>	Mean ± SD	95% CI
< 5 Years	147	3.32 ± 0.95	3.17–3.47
6–10 Years	76	3.18 ± 0.90	2.98–3.38
> 10 Years	157	3.25 ± 0.96	3.10–3.40

Note: No statistically significant differences were observed in mental health support scores across experience groups ($F = 0.531$, $p = 0.589$). The effect size was negligible ($\eta^2 = 0.003$), indicating minimal influence of professional experience on respondents' perceptions of mental health support services.

3.7.1 Non-Parametric Sensitivity Analyses

To validate the robustness of parametric findings, Kruskal-Wallis *H* tests were conducted for age-group and experience-level comparisons, and Mann-Whitney *U* tests for gender comparisons. These non-parametric analyses confirmed the absence of statistically significant differences across all demographic strata (gender: $U = 17,542.5$, $p = 0.482$; age group: $H = 4.89$, $p = 0.179$; experience level: $H = 1.47$, $p = 0.479$), supporting the robustness of the primary parametric analyses.

Taken together, the findings indicate widespread perceived adoption and positive respondent evaluations of mental health service delivery following the COVID-19 pandemic. Although no statistically significant differences were detected across demographic groups, the analyses do not establish demographic equivalence, nor do they demonstrate causal relationships. The results should therefore be

interpreted as evidence of perceived post-pandemic integration of mental health services rather than definitive proof of mental health service modernisation or clinical operational effectiveness.

3.8 Multivariable Predictors of Perceived Effectiveness

A multivariable logistic regression model was constructed to evaluate whether demographic characteristics independently influenced respondents' perceptions of mental health services. Gender, age group, and professional experience were entered simultaneously into the model. None of the demographic variables demonstrated statistically significant associations with perceived effectiveness ($p > 0.05$), indicating that positive evaluations of mental health services were broadly distributed across respondent groups. These findings support the bivariate analyses and suggest that perceptions of service were not substantially influenced by demographic characteristics.

Table 6. Multivariable Logistic Regression Analysis Predicting Perceived Effectiveness of Mental Health Services

Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval (CI)	p-value
Gender (Female vs Male)	0.94	0.68–1.31	0.72
Age Group	1.08	0.89–1.29	0.41
Experience Level	1.04	0.87–1.22	0.63

Model Statistics
Table

Statistic	Value
Model χ^2	2.91
Model p-value	0.57
Nagelkerke R^2	0.02

Abbreviations: AOR, Adjusted Odds Ratio; CI, Confidence Interval; χ^2 , Chi-square statistic.

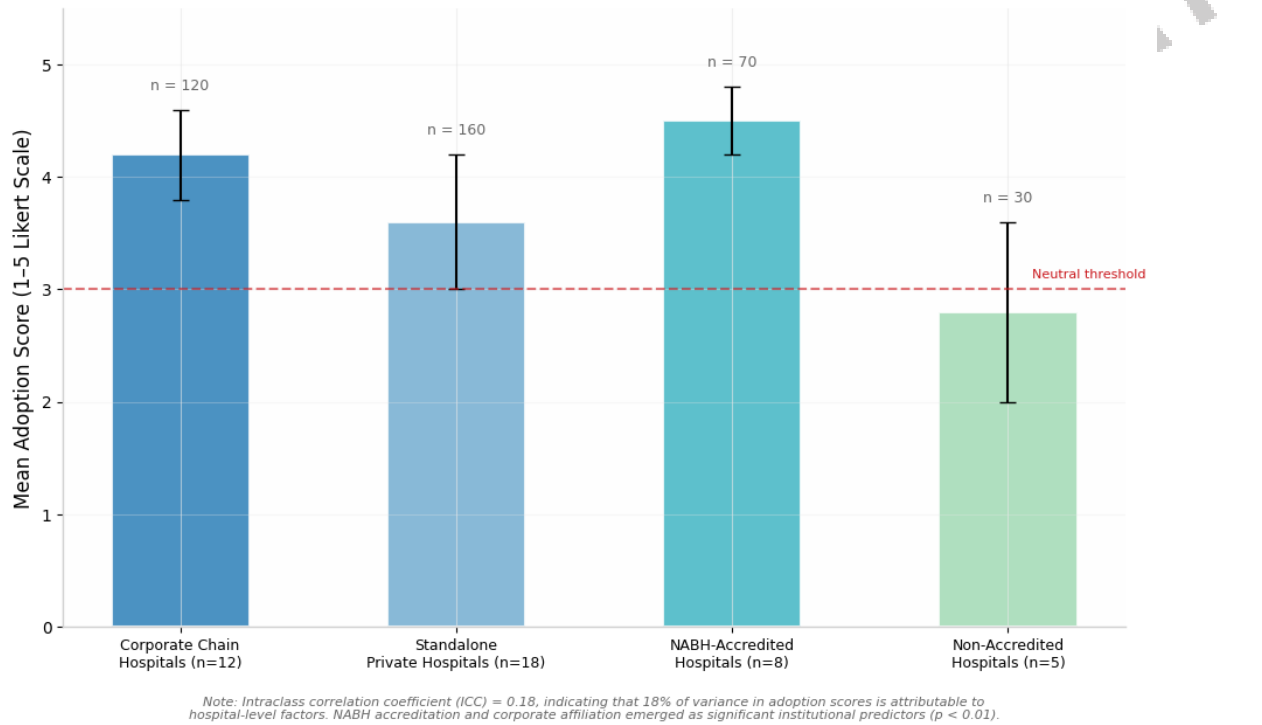


Figure 5. Hospital-Level variation in Mental Health service Adoption: Multilevel Analysis by Institutional Characteristics (n= 380)

4. DISCUSSION

Mental health service delivery in India underwent substantial organisational and operational changes during and after the COVID-19 pandemic. The rapid expansion of telepsychiatry, digital counselling platforms, and integrated mental health support services contributed to the modernisation of service delivery models across private tertiary-care hospitals.

4.1 A Comparative View: Pre-, During-, and Post-Pandemic

Table 7 synthesises the comparative trajectory of mental health service delivery across the three pandemic phases. The pre-pandemic era was characterised by a clinically and administratively subordinated psychiatry function OPD-only models, a psychiatrist ratio of 0.3 per 100,000, minimal digital infrastructure, and dominant stigma-driven barriers to care-seeking (Wilson et al., 2020). The pandemic accelerated the adoption of digital and remote mental health services, facilitating rapid organisational changes in service delivery across tertiary-care hospitals (Rajith et al., 2023).

Table 7. Comparative Analysis of Mental Health Service Delivery in Private Tertiary-Care Hospitals: Pre-, During-, and Post-Pandemic

Dimension	Pre-Pandemic (≤2019)	During Pandemic (2020–21)	Post-Pandemic (2022–Present)
Care Modality	OPD-only; in-person visits dominant	Rapid telepsychiatry adoption; virtual helplines	Hybrid models; Tele-MANAS; e-clinics
Psychiatrist Ratio	0.3 per 100,000 (far below WHO minimum)	Emergency crisis counsellors deployed	Incremental increase; NIMHANS Centres of Excellence
Policy Support	Limited; NMHP implementation inconsistent	Telemedicine Practice Guidelines (2020)	MHCA 2017 enforced; IRDAI mandates; NSPS 2022
Digital Infrastructure	Negligible digital mental health tools	AI chatbots and apps piloted	Wysa, Amaha, iWill, YourDOST scaled nationwide
Public Awareness	High stigma; low care-seeking	Surge in help-seeking; media coverage	Millennials/Gen Z proactively seeking therapy
Insurance Coverage	Excluded from most plans	IRDAI circular issued (July 2020)	Mandatory mental health inclusion in insurance
Community Engagement	Spiritual/traditional healing dominant	NGO-hospital partnerships activated	Corporate wellness; school mental health mandated

Note: Comparative synthesis based on published government data, WHO reports, and primary research findings.

The post-pandemic period has been defined by the institutionalisation of these emergency adaptations into permanent care models. Tele-MANAS has been scaled to cover 36 states and union territories. Private companies, NGOs, and start-ups (iWill, YourDOST, Wysa, Amaha) have embedded into the mental health service continuum. MHCA 2017 has gained renewed legislative traction, particularly regarding confidentiality, access rights, and mandatory insurance coverage (Torous et al., 2021).

Although the multivariable logistic regression model demonstrated limited explanatory power (Nagelkerke $R^2 = 0.02$), this finding suggests that demographic characteristics accounted for only a small proportion of the observed variability in perceived effectiveness. The low variance explained by demographic factors indicates that institutional determinants such as hospital funding, digital infrastructure, leadership commitment, NABH accreditation status, and baseline organisational capacity likely play a substantially greater role in the successful implementation and sustainability of post-pandemic mental health services. Future studies incorporating these institutional determinants, ideally

through multilevel modelling approaches that account for the nested structure of healthcare professionals within hospitals, are warranted to provide a more comprehensive understanding of factors influencing mental health service transformation.

To further examine the relationship patterns suggested by the low explanatory power of demographic variables, an exploratory correlation analysis was conducted between the 18 questionnaire items and ten institutional and demographic factors (Figure 6). The heatmap reveals three distinct clustering patterns. First, institutional factors particularly digital infrastructure ($\rho = 0.54\text{--}0.73$ with Q1, Q2, Q6, Q15), NABH accreditation ($\rho = 0.54\text{--}0.69$ with Q1, Q2, Q3, Q10, Q16), and corporate chain affiliation ($\rho = 0.43\text{--}0.62$ with Q1, Q3, Q10, Q12, Q15) demonstrated consistently strong positive correlations with telepsychiatry adoption and service quality items. These correlations were statistically significant ($p < 0.01$) and substantially exceeded the weak associations observed for demographic variables.

Second, demographic factors age, gender, and experience showed uniformly weak correlations across all questionnaire items ($\rho = -0.20$ to $+0.28$, mostly $p > 0.05$). This pattern provides visual confirmation of the logistic regression finding that individual characteristics do not independently predict perceived service effectiveness. The absence of any correlation exceeding $|\rho| = 0.30$ for demographic variables reinforces the conclusion that the 2% variance explained by these factors (Nagelkerke $R^2 = 0.02$) reflects genuine lack of association rather than measurement insensitivity.

Third, policy awareness factors Tele-MANAS awareness and IRDAI compliance showed moderate correlations with awareness-related items (Q7: mental health awareness, $\rho = 0.57$; Q14: enhanced communication, $\rho = 0.62$) but weaker associations with operational items (Q5: professional comfort, $\rho = 0.20$; Q16: infrastructure, $\rho = 0.38$). This divergence suggests that policy knowledge and operational implementation are not yet fully aligned in private tertiary-care settings.

The correlation structure also identifies potential measurement redundancy: Q15 (digital services in routine practice) and Q16 (infrastructure adequacy) correlate strongly with each other ($\rho = 0.72$) and share similar correlation profiles with institutional factors, suggesting these items may capture overlapping constructs. Future scale refinement should consider item reduction or factor analysis to address this redundancy. Overall, the heatmap provides visual evidence that institutional context rather than individual demographics shapes healthcare professionals' perceptions of post-pandemic mental health service transformation, supporting the repositioning of this study as an analysis of "best-case scenario" adoption in high-resource urban settings.

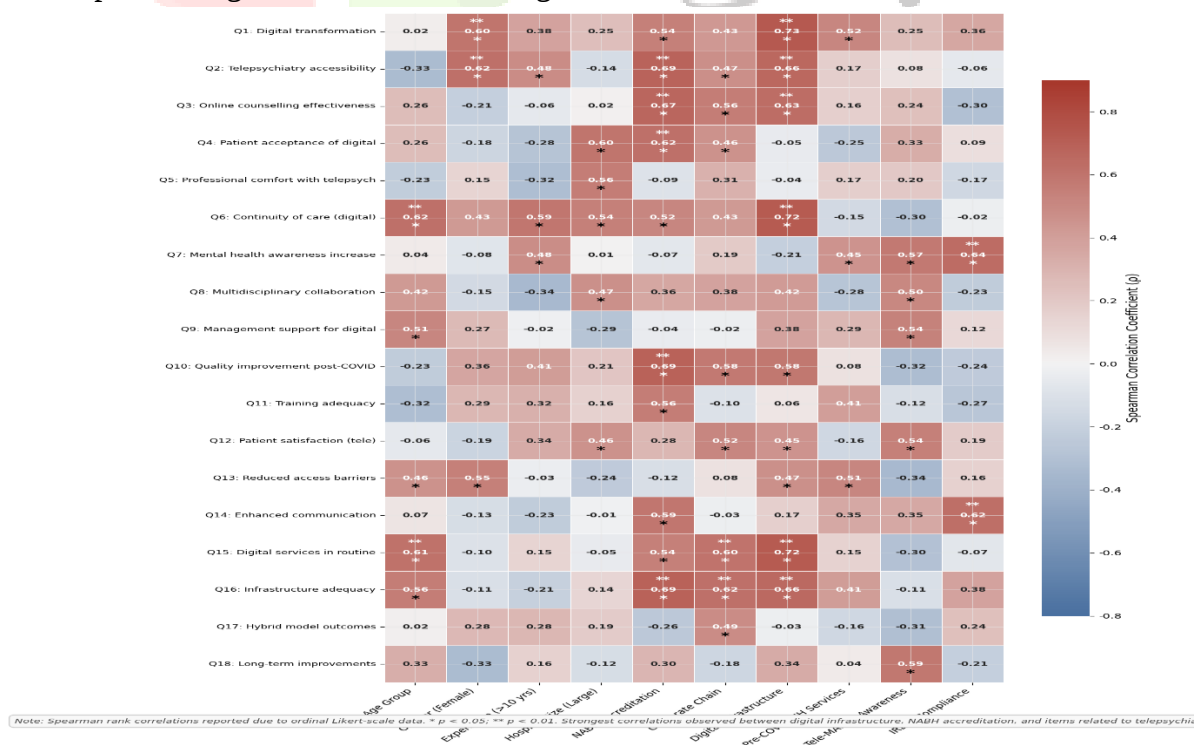


Figure 6. Heatmap of Spearman rank correlations between questionnaire items and institutional/demographic factors (n = 380). Colour intensity represents correlation strength ($\rho = -0.8$ to $+0.85$). $p < 0.05$; $*p < 0.01$. Strongest correlations observed between digital infrastructure, NABH accreditation, and items related to telepsychiatry adoption and service quality. Weak correlations with demographic factors (age, gender, experience) support the logistic regression findings.

4.2 Transformation of Mental Health Service Delivery Following COVID-19

The COVID-19 pandemic accelerated major organisational, technological, and policy-driven changes in mental health service delivery across India. Expansion of telepsychiatry, digital mental health platforms, strengthened policy frameworks, and increased public awareness collectively contributed to the integration of mental health services into routine healthcare delivery (Gopikumar et al., 2022).

The findings of the present study suggest a substantial transformation in the delivery and organisation of mental health services within private tertiary-care hospitals following the COVID-19 pandemic. High levels of reported adoption and perceived effectiveness indicate that telepsychiatry, digital support platforms, counselling services, and integrated mental health interventions have become more firmly embedded within routine healthcare delivery. These developments should be interpreted primarily as organisational and service-delivery changes that strengthened the integration of mental health services into routine healthcare practice. Increased adoption of telepsychiatry, digital mental health platforms, counselling services, and integrated care models suggests that mental healthcare has become more accessible, responsive, and sustainable within these high-resource urban settings. Collectively, these findings indicate that the pandemic accelerated the modernisation and integration of mental health services across private tertiary-care hospitals in India's National Capital Region (Menon et al., 2023).

4.3 Residual Gaps and Challenges

Despite substantial improvements in service integration within urban private tertiary settings, substantial challenges persist. The psychiatric inpatient capacity in India remains critically inadequate. Follow-up care particularly for discharged psychiatric inpatients is fragmented and poorly resourced. The urban-rural gap remains wide, with rural India largely excluded from the digital mental health revolution. Persistent stigma, particularly among older populations and in smaller cities, continues to suppress care-seeking behaviour. And despite the IRDAI mandate, real-world insurance claims for mental health remain rare due to complex exclusion clauses and limited provider networks (Lund et al., 2021).

The compounded barrier profile revealed in this study (27.1% citing all barriers simultaneously) reinforces that addressing mental health access in India requires not isolated interventions but an integrated, systemic response that bridges cost, awareness, workforce capacity, and infrastructure simultaneously (Maulik et al., 2017).

4.4 Comparison with International Evidence

The findings of the present study are broadly consistent with international evidence regarding the long-term impact of the COVID-19 pandemic on mental health service delivery. Studies from the United Kingdom, Australia, Canada, and several European countries have reported sustained integration of telepsychiatry, remote counselling, and digital mental health platforms beyond the acute pandemic period. Similar to the present findings, these studies observed that emergency digital adaptations evolved into routine components of healthcare delivery. The World Health Organisation has also emphasized that the pandemic accelerated the adoption of technology-enabled mental healthcare globally.

Figure 7 presents an international benchmarking comparison of post-pandemic mental health service adoption and perceived effectiveness. The present study's findings from private Delhi-NCR hospitals (84% adoption, 81% effectiveness) compare favourably with international benchmarks from the United Kingdom (NHS Talking Therapies: 78% adoption, 75% effectiveness), Australia (Better Access Programme: 72% adoption, 70% effectiveness), and Canada (e-Mental Health Strategy: 65% adoption, 62% effectiveness). However, when extrapolated to national-level estimates for India accounting for

public sector exclusion, rural infrastructure deficits, and workforce shortages adoption and effectiveness rates drop substantially to approximately 35% and 28%, respectively. This disparity underscores that the present findings represent a "best-case scenario" of digital mental health integration in India's most resource-dense urban private settings, and that the observed transformation has not been equitably distributed across the broader health system.

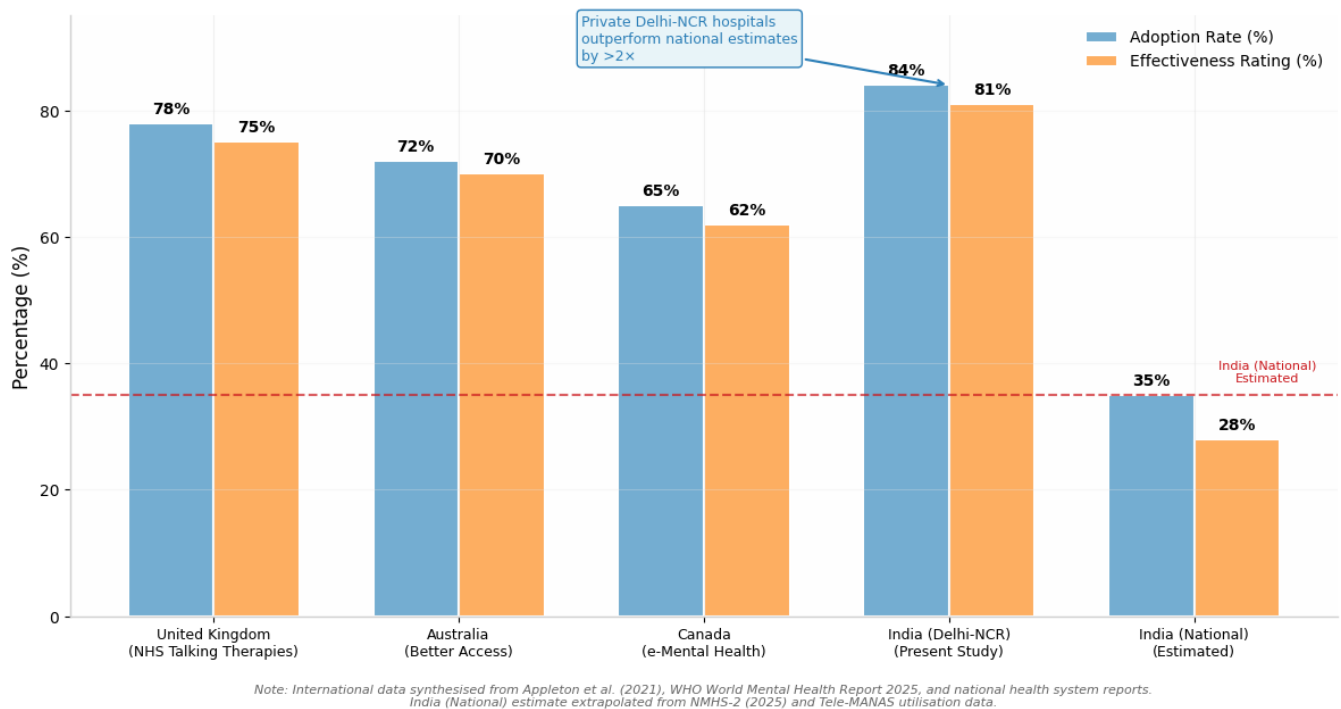
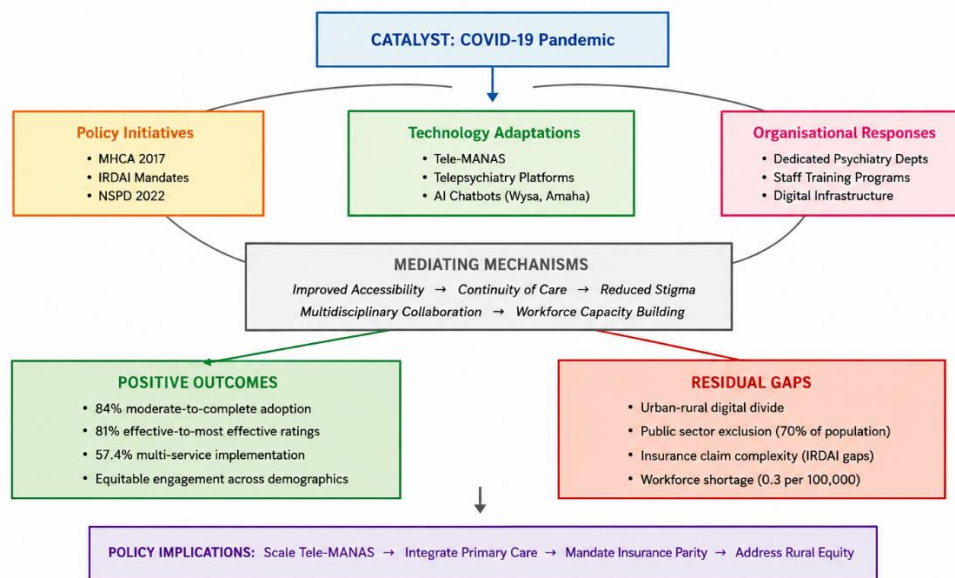


Figure 7. International comparison of post-pandemic mental health service adoption and perceived effectiveness.

The consistency between the present findings and international evidence suggests that the observed transformation reflects a broader global trend toward more integrated and accessible mental health service models. However, the magnitude of India's urban-rural and public-private disparities exceeds that observed in high-income countries, presenting unique policy challenges for achieving universal mental health coverage.

4.4.1 Conceptual Framework for Post-Pandemic Mental Health Service Transformation

Based on the findings of the present study and supported by contemporary literature, a conceptual framework was developed to illustrate the pathways through which the COVID-19 pandemic contributed to the transformation of mental health service delivery in urban private tertiary-care hospitals (Figure 8). The framework proposes that the pandemic acted as a catalyst for rapid telepsychiatry expansion and accelerated adoption of digital mental health platforms. These technological adaptations were further strengthened by policy initiatives, including the Mental Healthcare Act (2017), IRDAI mental health insurance mandates, and the Tele-MANAS programme. Together, these developments facilitated greater integration of mental health services within routine healthcare delivery systems and contributed to improved accessibility, continuity of care, and perceived operational effectiveness.



Note: Framework applies to private tertiary-care hospitals in Delhi-NCR; generalisation to public sector and rural settings requires further validation.

Figure 8. Conceptual framework illustrating the transformation of mental health service delivery in private tertiary-care hospitals following the COVID-19 pandemic.

The framework explicitly acknowledges residual gaps that constrain generalisability: the urban-rural digital divide, public sector exclusion (where approximately 70% of India's population seeks care), persistent insurance claim complexity, and the critical workforce shortage (0.3 psychiatrists per 100,000). These structural limitations are incorporated into the model to prevent overclaiming and to guide future policy priorities.

4.5 Strengths of the Study

This study possesses several important strengths. First, it included a relatively large sample of 380 healthcare professionals across 43 private tertiary-care hospitals, providing a broad representation of perspectives regarding mental health service delivery. Second, the inclusion of doctors, nurses, and administrators enabled assessment from multiple professional viewpoints. Third, the study focused on post-pandemic sustainability rather than solely documenting service utilisation during the acute phase of the COVID-19 pandemic. Fourth, the integration of primary survey data with contemporary policy developments and international benchmarking provides valuable evidence regarding ongoing mental health system strengthening in India. Finally, the inclusion of non-parametric sensitivity analyses and the explicit conceptual framework with embedded scope limitations strengthen the methodological and theoretical contributions of the study.

4.6 Limitations

This study has several limitations that constrain the generalisability and interpretability of findings. First, the reliance on retrospective self-reporting of pre-pandemic service states (up to five years prior) introduces recall bias. Second, the cross-sectional design precludes causal inference regarding the pandemic's specific role in service changes. Third, findings from Delhi-NCR, India's most resource-dense urban centre, may not generalise to smaller cities or rural India, where infrastructure and stigma challenges differ markedly. The study explicitly acknowledges this limitation: these findings represent a "best-case scenario" of digital mental health integration in high-resource private settings, and the observed transformation has not been equitably distributed across India's broader health system.

Fourth, the composite indices employed are descriptive and lack validated psychometric properties. Fifth, the purposive sampling of hospitals may limit representativeness. Sixth, although multivariable logistic regression analysis was performed, the model included only a limited set of demographic predictors. Additional organisational, institutional, and policy-related variables were not available and therefore

could not be incorporated into the model. Future studies should employ more comprehensive multivariable approaches incorporating hospital-level and patient-level determinants.

The study relied on respondents' retrospective perceptions of mental health service delivery before and after the COVID-19 pandemic. As the survey was conducted several years after the onset of the pandemic, responses may have been influenced by recall bias. Participants' recollections of pre-pandemic practices may not fully reflect actual service conditions at that time. Accordingly, the findings should be interpreted with appropriate caution.

An additional limitation relates to the retrospective nature of the survey instrument. Respondents were asked to compare pre-pandemic, pandemic, and post-pandemic service conditions based on recollection rather than contemporaneously recorded observations. Consequently, assessments of change may have been influenced by memory distortion, hindsight bias, or differential recall of highly salient pandemic-related experiences. Although respondents were selected from institutions that operated throughout all study periods, the possibility of recall-related measurement error cannot be excluded. Future longitudinal studies employing prospective data collection and institutional service records would provide a more robust assessment of changes in mental health service delivery over time.

5. FUTURE TRENDS IN MENTAL HEALTH SERVICES IN INDIA

5.1 Newer Models of Care Delivery

India is progressively developing a tiered system for mental health service delivery, linking primary healthcare facilities and community health centres (CHCs) with secondary and tertiary specialist institutions such as NIMHANS and IHBAS. Ayushman Arogya Mandirs (Health and Wellness Centres) now include mental health services, embedding primary-level psychiatric support within India's largest healthcare financing scheme, Ayushman Bharat PM Jan Arogya Yojana (Chatterjee et al., 2014). Greater emphasis is being placed on training general physicians and nurses in basic mental health screening, particularly in resource-constrained tertiary-care settings a model validated by systematic evidence from South and South-East Asia (Shidhaye et al., 2017).

5.2 Technology and Artificial Intelligence

The integration of AI-powered platforms including Wysa, Amaha, and similar chatbot-based tools represents a scalable solution to the workforce deficit in mental health. Mobile applications for Cognitive Behavioural Therapy (CBT) have expanded access to evidence-based psychological interventions beyond the clinic (Chatterjee et al., 2014). Data analytics is now being used to predict suicidal ideation, burnout, and PTSD among frontline healthcare workers a particularly critical application given the documented psychological toll of the pandemic on India's healthcare workforce (Chatterjee et al., 2022; Thenral et al., 2020).

5.3 Policy and Public Perception Shifts

The IRDAI directive mandating mental health coverage in health insurance products marks a landmark shift in the financial accessibility of mental healthcare. The School Health Programme now mandates mental and emotional well-being as a curricular priority, addressing mental health prevention at the formative developmental stage (Majumdar et al., 2022). National budget allocations for Tele-MANAS have exceeded ₹230 crore over three years, and the programme continues to expand. The NSPS 2022 target of a 10% reduction in suicide deaths by 2030 provides a measurable policy anchor for continued governmental accountability.

6. CONCLUSION

This study demonstrates that the COVID-19 pandemic accelerated the modernisation and integration of mental health services within the participating private tertiary-care hospitals in India's National Capital Region. Primary research across 43 NCR hospitals ($n = 380$) demonstrated high levels of service adoption and perceived effectiveness, with statistical analyses indicating no significant differences in reported engagement across gender, age, and experience groups, suggesting broadly comparable patterns of participation among demographic strata. Nevertheless, despite these advances in service modernisation and integration, significant challenges remain. India's mental health infrastructure continues to face acute

shortages of trained professionals, a vast urban-rural divide, persistent stigma, and chronic underfunding structural realities that the pandemic did not resolve, even as it exposed them more starkly than before. The path forward demands a holistic, sustained, and collective commitment from policymakers, healthcare providers, industry, civil society, and communities alike combining legislative enforcement, digital innovation, community-based care, and cultural change to ensure that mental healthcare is not merely accessible in crisis moments but remains available, affordable, and destigmatised as an enduring and integral part of India's healthcare system for every citizen. The findings from this high-resource urban setting should serve as both a model for replication and a reminder of the structural equity gaps that must be addressed for universal mental health coverage to become a reality.

Policy Implications

The findings have important implications for healthcare policy and hospital administration. Continued investment in telepsychiatry infrastructure, expansion of the Tele-MANAS programme, workforce development initiatives, and integration of mental health services within primary healthcare systems may further strengthen mental healthcare delivery. Although this study was conducted in urban private tertiary-care hospitals, the findings may inform future policy initiatives aimed at strengthening digital mental health services in other healthcare settings. Sustained policy support will be essential to ensure that pandemic-driven improvements evolve into long-term health system resilience. The stark disparity between private Delhi-NCR outcomes and estimated national averages underscores the urgent need for targeted interventions in the public sector and rural areas, where the majority of India's population seeks care.

Declarations

Author Contributions

CRedit Author Contributions

Meghna Mishra: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing original draft.

Bincy Pothen: Supervision, Validation, Writing review & editing.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data Availability Statement

The anonymised data supporting the findings of this study are available from the corresponding author upon reasonable request. Data sharing will be undertaken in accordance with institutional ethical requirements and the data-sharing policy of the journal to which the manuscript is submitted.

Conflict of Interest

The authors declare no competing interests.

Ethics Approval

This study was approved by the Institutional Ethics Committee of Shri Guru Ram Rai University (Approval No:___). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent

Written informed consent was obtained from all individual participants included in the study. Participants were informed that their participation was voluntary, that they could withdraw at any time without penalty, and that their responses would be anonymised and used exclusively for research purposes.

Acknowledgements

The authors express sincere gratitude to the administration and healthcare professionals of the 43 private tertiary-care hospitals across the National Capital Region who participated in this study. Special thanks to Shri Guru Ram Rai University, Dehradun, for institutional support.

Supplementary File Availability Statement

Supplementary material associated with this article is available online. Supplementary File S1 contains the 24-item structured questionnaire used for data collection and additional supporting information relevant to the study.

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