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Impact of Digital Mental Health Interventions on Disparities in Mental Health Service Utilization in Saudi Arabia: Systematic Review

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ABSTRACT

Digital mental health interventions (DMHIs) have emerged as transformative tools in addressing mental health disparities in Saudi Arabia, where the lifetime prevalence of mental disorders is 34.2%. This systematic review evaluates the impact of DMHIs, such as telepsychiatry, mobile apps, and AI-driven platforms like the Saudi Mental Health Access and Referral Centralized system (SMARC), on service utilization, accessibility, and stigma reduction. Following PRISMA 2020 guidelines, we analyzed seven studies from 548 records, encompassing cross-sectional, qualitative, and mixed-methods designs.

Findings indicate that DMHIs significantly improved service access, with SMARC recording over 10,000 referrals and an 82.5% acceptance rate. However, regional disparities persist, with urban areas like Riyadh and Jeddah benefiting disproportionately due to better infrastructure, while rural regions face challenges like poor internet connectivity and low digital literacy. The COVID-19 pandemic accelerated DMHI adoption, particularly for online therapy, yet rural uptake remained limited. Culturally adapted interventions, including gender-segregated platforms and WhatsApp-based psychoeducation, effectively reduced stigma, with 97.4% of users expressing satisfaction. However, deep-seated cultural stigma and privacy concerns continue to hinder engagement, especially among women and conservative communities.

Key barriers include uneven digital infrastructure, technical difficulties, and literacy gaps. Recommendations include targeted investments in rural digital health, hybrid (digital and in-person) models, and community-based stigma reduction campaigns. By integrating global best practices with localized solutions, Saudi Arabia can leverage DMHIs to bridge mental health disparities. Policymakers must prioritize equitable access to ensure the benefits of digital transformation reach all populations.

Keywords: *Digital mental health, Saudi Arabia, health disparities, telepsychiatry, stigma, service utilization*

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1. INTRODUCTION

Mental health disorders are a pressing global public health concern, affecting an estimated 25% of individuals at some point in their lives [1,2]. In Saudi Arabia, the burden is even more significant, with a lifetime prevalence of mental disorders reaching 34.2% [1,3]. Historically, mental health issues in the Kingdom were surrounded by stigma and misconceptions, deterring many from seeking care and resulting in a substantial treatment gap [4,5]. However, recent societal and policy

shifts have catalyzed change. Younger generations, growing public awareness, and government initiatives, such as the establishment of the National Center for Mental Health Promotion and the launch of community-based psychological programs, have contributed to increased normalization and access to mental health services across the country [4].

Against this backdrop, digital health technologies have emerged as transformative tools in delivering mental health care. Digital interventions (including mobile applications, telepsychiatry, and electronic referral systems) hold the potential to overcome longstanding barriers by offering privacy, reducing stigma, and enhancing service accessibility [1,6]. Saudi Arabia has embraced this shift, exemplified by the creation of the Saudi Medical Appointments and Referrals Centre (SMARC), an AI-powered e-referral system designed to streamline care and expand service reach [1,7].

This digital transformation is timely, given the rising incidence of mental health conditions. For instance, depressive disorders increased by nearly 60% between 2011 and 2021, with incidence rates rising from 4,913.71 to 6,039.77 per 100,000 people [1]. Traditional models of care have struggled to meet this rising demand, particularly for marginalized populations such as those in remote areas, women, and individuals facing social stigma [1,6]. Digital mental health tools, therefore, offer scalable solutions to address these disparities.

Emerging literature suggests that digital interventions can improve equity in mental health service utilization [8,9]. Their anonymity encourages help-seeking behavior by alleviating fear of social repercussions [4]. Yet, their implementation also introduces new challenges, including digital literacy gaps, privacy concerns, and unequal access to technology [4]. Additionally, Saudi Arabia's unique sociocultural landscape, marked by gender norms and persistent stigma, may influence the effectiveness and reach of these tools [4,10].

Given these complexities, this systematic review aims to assess the impact of digital mental health interventions (DMHIs) on disparities in mental health service utilization in Saudi Arabia. Specifically, it evaluates their role in improving access for underserved populations, mitigating stigma-related barriers, and identifying limitations in adoption. As the country advances its digital health agenda, evidence from this review will inform policymakers on how to optimize digital mental health strategies to promote equitable care for all.

2. METHODOLOGY

Research Design

This systematic review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines [11] to ensure methodological rigor and transparency.

Search Strategy

A systematic search was conducted across the following electronic databases: PubMed, Embase, Scopus, Cochrane Library, Google Scholar, and PsycINFO. A combination of Medical Subject Headings (MeSH) terms and free-text keywords were used, including: Population terms (*Saudi Arabia"*, *"mental health"*, *"mental disorders"*, *"mental health services."),* Intervention terms (*"digital mental health"*, *"telepsychiatry"*, *"mobile apps"*, *"e-mental health"*, *"SMARC"*, *"AI mental health."), and* Outcome terms (*"health disparities"*, *"service utilization"*, *"accessibility"*, *"stigma"*, *"digital literacy"*, *"privacy concerns.")*.

Example search string used are: ("Digital mental health" OR "telepsychiatry" OR "mobile apps" OR "e-referral") AND ("mental health disparities" OR "service utilization" OR "accessibility") AND ("Saudi Arabia" OR "Middle East")

Inclusion Criteria

Population: Individuals in Saudi Arabia using or eligible for DMHIs (e.g., rural populations, women, stigmatized groups).

Intervention: Digital mental health tools (e.g., telepsychiatry, mobile apps, AI-driven platforms like SMARC).

Comparators: Traditional mental health services or different digital intervention models.

Outcomes: Changes in mental health service utilization rates, reductions in stigma or cultural barriers, challenges such as digital literacy gaps, privacy concerns, and regional disparities.

Study Types: RCTs, cohort studies, cross-sectional studies, and qualitative studies published in English or Arabic within the last 10 years (2015–2025).

Exclusion Criteria: We excluded studies that did not focus on Saudi Arabia, non-peer-reviewed articles, conference abstracts, editorials, and case reports, and those lacking empirical data on DMHIs.

Data Selection and Screening

The data selection and screening process were systematic to ensure the inclusion of high-quality, relevant studies.

Two independent reviewers screened the titles and abstracts from databases against the inclusion and exclusion criteria. Any discrepancies between reviewers were resolved through discussion, and if consensus could not be reached, a third

reviewer was consulted to make the final decision.

A full-text review of the studies that pass the initial screening was performed. The reviewers assess each articled in detail to confirm its eligibility. Studies that did not meet the criteria were excluded. Finally, the reference lists of relavant studies was manually searched to identify additional relevant literature that may have been missed in the initial database search.

Data Extraction and Synthesis

During data extraction, we captured study characteristics, including the author(s), publication year, research design. Participant demographics were also be recorded and in addtion, intervention details were extracted, including the type of digital tool used (e.g., mobile apps, telepsychiatry, AI-driven platforms).

Key findings will be categorized into several domains: (1) impact on service utilization disparities, examining whether digital interventions reduced inequities in access; (2) changes in accessibility for underserved groups, such as rural populations or women; (3) user engagement and satisfaction, assessing acceptability and usability; and (4) reported challenges, including digital literacy barriers, privacy concerns, and technological limitations.

Quality Assessment

The methodological quality and risk of bias of included studies was assessed using established tools appropriate for each study design. Cross-sectional and qualitative studies will be evaluated using the JBI Critical Appraisal Checklist [12], which assesses methodological soundness across multiple criteria.

Two independent reviewers conducted quality and risk of bias assessments, with any discrepancies resolved through discussion or, if necessary, consultation with a third reviewer. Studies were categorized as having low, moderate, or high risk of bias based on these evaluations.

3. RESULTS

Study Selection Process

The systematic review process yielded a final inclusion of seven studies from a total of 548 records identified through database and manual searches (Figure 1). After removing duplicates and ineligible entries, 201 records underwent screening, with 150 excluded. Of the 51 reports sought for retrieval, 28 were assessed for eligibility, and 21 were excluded. Additionally, 45 records were identified through website and citation searches, but only one qualified after eligibility assessment.

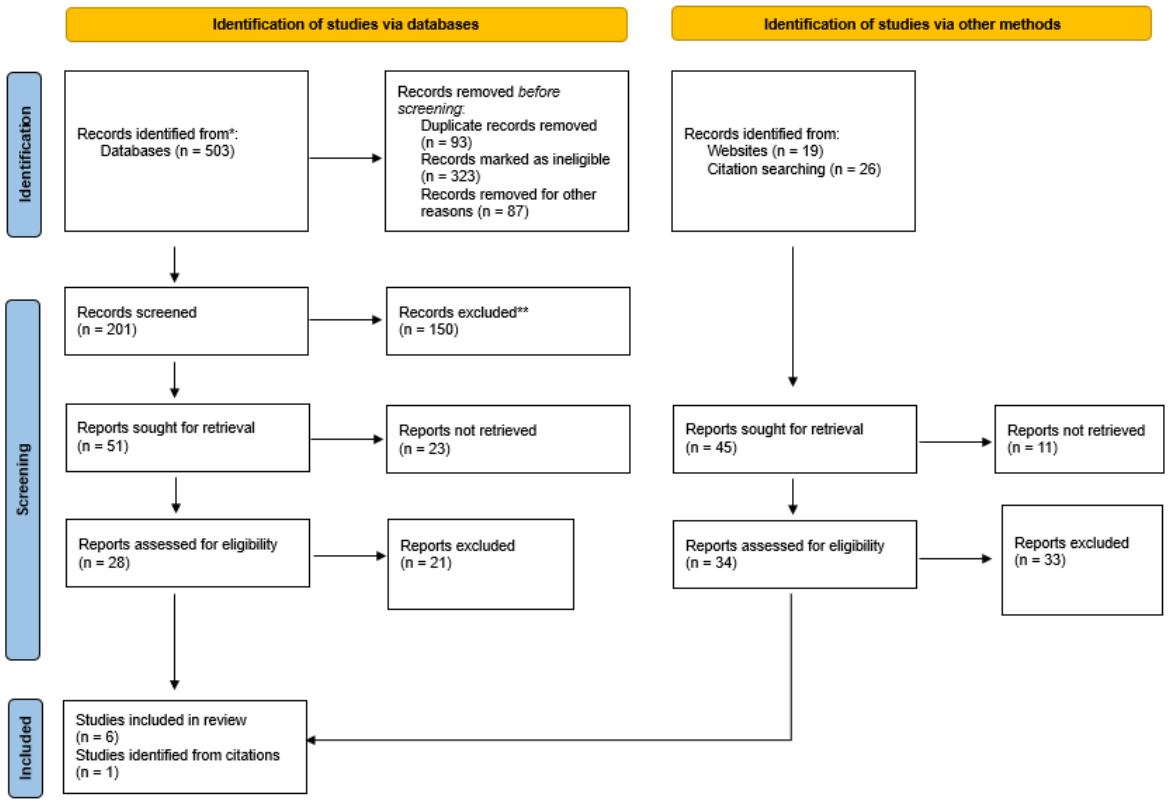

Figure 1. PRISMA Flow chart showing the study selection process

Characteristics of Digital Mental Health Interventions and Study Populations

The studies summarized in Table 1 showcase a wide range of DMHIs implemented across Saudi Arabia, using various methodological designs to assess service utilization, accessibility, and user perceptions. The majority of included studies adopted cross-sectional designs, reflecting a quantitative focus on patterns of access and satisfaction with digital platforms. Alharbi et al. [1,13] evaluated the Saudi Mental Health Access and Referral Centralized system (SMARC), a national e-referral platform employing artificial intelligence to improve care coordination. These studies analyzed large datasets of psychiatric referrals (n=10,033 and n=9,722 respectively), offering comprehensive insight into referral patterns and acceptance factors across diverse regions and demographics.

Other studies explored more personalized or decentralized interventions. For example, Alhalawany et al. [14] examined the uptake of online therapy during the COVID-19 pandemic among 400 residents of Riyadh, while Alomari and Jenkins [15] employed a qualitative design to capture attitudes toward the Seha application in Jeddah. These diverse methods enriched the evidence base, combining quantitative service utilization data with in-depth perspectives on user experience.

Special populations were also represented, such as in Hemdi's mixed-methods study of WhatsApp-delivered psychoeducation for mothers of children with autism [16]. Meanwhile, Sayed et al. [17] and Alshareef and Alwabel [18] focused on general adult populations across the country, evaluating usability and satisfaction with telehealth services like Sehhaty and other virtual consultation platforms.

Table 1. Characteristics of Included Studies

Study	Study Design	Digital Intervention Type	Population Demographics	Area studied
Alharbi et al. [1], 2025a	Cross-sectional	Centralized electronic referral system (Saudi Mental Health Access and Referral Centralized system, with artificial intelligence and predictive analytics)	National, psychiatric electronic referrals (n=10,033), majority men, 18–44 years, Saudi nationals	Referral patterns, service accessibility, predictors of external referrals
Alharbi et al. [13], 2025b	Cross-sectional	Nationwide electronic referral system (Saudi Mental Health Access and Referral Centralized system)	National, mental health electronic referrals (n=9,722)	Referral acceptance rates, factors influencing acceptance
Alhalawany et al. [14], 2024	Cross-sectional	Online therapy via internet/mobile applications	Riyadh adult residents (n=400)	Impact of COVID-19 on online mental health service use
Alomari and Jenkins [15], 2021	Qualitative	Seha application (telehealth)	Jeddah, 17 residents	User attitudes toward Seha during COVID-19
Alshareef and Alwabel [18], 2024	Cross-sectional	Sehhaty application, telephone/video consultations	National, adults (n=916)	Patient opinions, satisfaction, factors influencing perceptions
Sayed et al. [17], 2025	Cross-sectional	Telehealth services (various)	National, adults (n=975)	Usability of telehealth for personalized care
Hemdi [16], 2017	Mixed methods	WhatsApp psychoeducation	Saudi Arabia, mothers of children with autism spectrum disorder	Effectiveness of WhatsApp-delivered psychoeducation

Geographic Reach and Infrastructure Gaps

Table 2 highlights regional disparities in the deployment and effectiveness of DMHIs, largely shaped by differences in technological infrastructure. While platforms like SMARC have improved access at a national level, their benefits remain unevenly distributed. Alharbi et al. [1,13] reported disproportionate utilization in the Western and Central regions, particularly Riyadh and Jeddah, compared to underrepresented rural areas like Albaha and the Northern Border region.

Infrastructure readiness emerged as a critical determinant of intervention success. Studies such as Alomari and Jenkins [15] and Alshareef and Alwabel [18] pointed to poor internet connectivity and limited smartphone access as major barriers in

rural settings. These challenges limit the reach of telehealth platforms such as Sehhaty and Seha, despite their success in urban environments. Hemdi [16] and Alkhalifah and Aldhalaan [19] further emphasized that even low-tech interventions like WhatsApp or mobile-based autism services struggled to gain traction in areas with inadequate digital literacy or connectivity.

The COVID-19 pandemic acted as a catalyst for increased digital mental health adoption, especially in urban centers. Alhalawany et al. [14] documented a surge in online therapy use in Riyadh during the pandemic, signaling both the adaptability of urban populations and the strain on in-person mental health infrastructure. However, this expansion did not occur uniformly across the country, reinforcing the need for targeted investments in rural digital health infrastructure to ensure equitable service delivery [1,18].

Table 2. Geographic Distribution and Infrastructure

Study	Digital vs Traditional Service Reach	Geographic Distribution	Infrastructure Requirements
Alharbi et al. [1], 2025a	Digital electronic referral system increased access, but regional disparities persist	Western, Northern Border, Albaha, Madinah, Eastern, Riyadh	Centralized Saudi Mental Health Access and Referral Centralized platform, artificial intelligence, predictive analytics
Alharbi et al. [13], 2025b	National digital system; regional patterns in acceptance	Nationwide	Saudi Mental Health Access and Referral Centralized electronic referral infrastructure
Alhalawany et al. [14], 2024	Online therapy increased during COVID-19	Riyadh	Internet/mobile application access
Alomari and Jenkins [15], 2021	Seha application increased access, but digital divide noted	Jeddah	Smartphone, internet
Alshareef and Alwabel [18], 2024	Telehealth reaches rural/remote, but urban-rural differences	National, rural/urban	Sehhaty, phone, video
Sayed et al. [17], 2025	Telehealth widely used, central region higher usability	National, central Saudi Arabia	Multiple telehealth platforms
Hemdi [16], 2017	WhatsApp intervention accessible, but reach unclear	National	WhatsApp, mobile

Stigma Reduction and Cultural Adaptation

Figure 2 shows how DMHIs can help mitigate cultural stigma, which is a longstanding barrier to mental healthcare in Saudi Arabia, while also emphasizing the importance of culturally adapted design. Alshareef and Alwabel [18] found that telehealth services, such as the Sehhaty application, were particularly beneficial in rural areas where stigma around mental health remains prevalent. The ability to access care discreetly encouraged help-seeking behaviors among individuals who might otherwise avoid traditional in-person consultations due to fear of social judgment. Similarly, Hemdi [16] noted that WhatsApp-based psychoeducation interventions were well-received, suggesting that private, text-based communication may lower barriers for vulnerable groups, such as mothers of children with autism.

While digital interventions show promise, their success depends on cultural adaptation. Alshareef and Alwabel [18] emphasized that incorporating culturally sensitive language, gender-segregated options, or religious considerations could enhance engagement. In addition, Hemdi [16] observed positive user engagement, hinting at the importance of intuitive design and relevance to the target population. Alshareef and Alwabel [18] noted that while telehealth reduces stigma, public health education campaigns are still needed to address deep-seated cultural resistance.

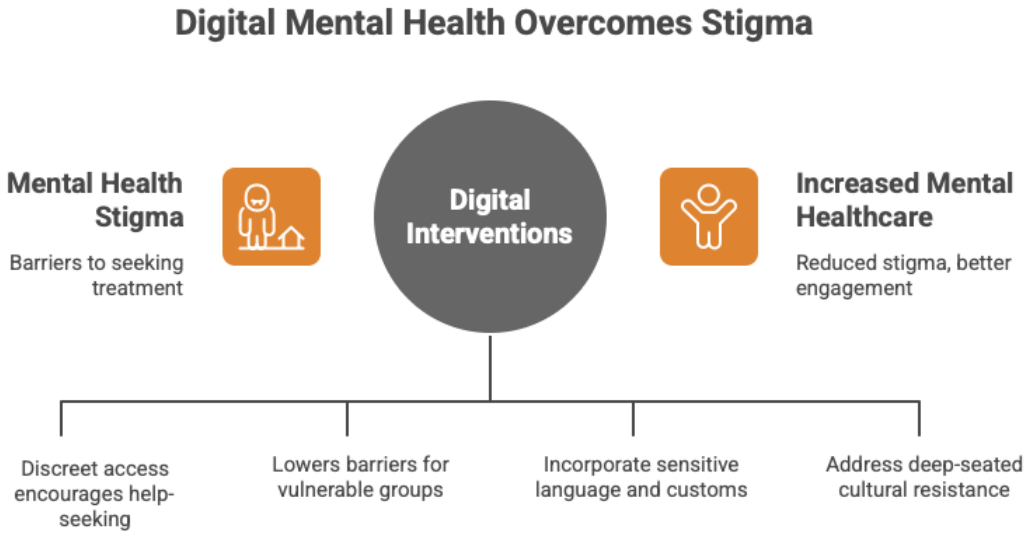

Figure 2. Stigma Reduction and Cultural Adaptation

Adoption Challenges and User Experience

DMHIs in Saudi Arabia have shown promise in expanding access, but several challenges persist in their adoption and integration (Table 3). One major barrier identified across studies is regional resource disparity, particularly affecting acceptance and coordination of care. Alharbi et al. [1,13] emphasized that while the centralized electronic referral system improved coordination, regional variations in resource availability significantly influenced acceptance rates. The SMARC platform, for instance, prioritized referrals based on clinical urgency, yet the impact varied by geography, suggesting a need for tailored implementation strategies in underserved regions.

Technical difficulties also remain a consistent challenge. Alomari and Jenkins [15] reported a clear digital divide, noting that while some users found digital platforms easy to navigate, others faced access issues due to poor internet connectivity and limited digital literacy. Similarly, Sayed et al. [17] highlighted low platform reliability (45.8%) and educational barriers, despite 76.4% of users finding the platforms easy to use and 60.1% expressing high satisfaction.

User satisfaction with digital mental health tools varied, but generally indicated favorable perceptions. Alshareef and Alwabel [18] reported that 97.4% of users were satisfied with virtual services, with video consultations being preferred over phone calls, especially in urban regions. Hemdi [16] also observed positive engagement in WhatsApp-based psychoeducation, despite limited therapist support, suggesting that low-tech, asynchronous communication may be effective in certain populations. However, the need for platform redesign to better accommodate both patient and provider needs was acknowledged, particularly in facilitating more seamless healthcare provider integration [18].

Table 3. Adoption Challenges and User Experience

Study	Technical Challenges	User Experience	Healthcare Provider Integration
Alharbi et al. [1], 2025a	Regional resource disparities	Not explored	Saudi Mental Health Access and Referral Centralized improved coordination
Alharbi et al. [13], 2025b	Resource availability affects acceptance	High acceptance (82.5%)	Prioritizes clinical urgency
Alomari and Jenkins [15], 2021	Technical issues, digital divide	Ease of use, but access problems for some	Not reported
Alshareef and Alwabel [18],	Telephone less preferred,	97.4% satisfaction,	Need for platform redesign

2024	urban/rural differences	video preferred	
Sayed et al. [17], 2025	Low reliability (45.8%), education barriers	76.4% easy to use, 60.1% high satisfaction	Not reported
Hemdi [16], 2017	Not reported	Positive engagement	Minimal therapist support

Service Utilization Impact

Evidence from Table 4 illustrates the significant influence DMHIs have had on service utilization across Saudi Arabia. The SMARC system demonstrated substantial utilization, with over 10,000 referrals recorded, and 82.5% of those being accepted [1,13]. However, the data revealed persistent regional disparities, with the Western region accounting for nearly half of all referrals (45.17%), suggesting that while digital systems can centralize care, equitable distribution remains a challenge.

COVID-19 catalyzed the expansion of online therapy, as documented by Alhalawany et al. [14], who reported increased usage during the pandemic in Riyadh and an overall positive user experience. Alomari and Jenkins [15] similarly observed an uptick in the use of the Seha application for emergency mental health needs during the pandemic, indicating increased acceptability in crisis situations.

On a national scale, Alshareef and Alwabel [18] reported that the Sehhaty platform facilitated over one million virtual consultations, with more than 90% of users expressing a preference for virtual over in-person services. The exceptionally high satisfaction rate (97.4%) highlights both the scalability and acceptability of virtual care, though rural-urban discrepancies persisted. Sayed et al. [17] further found that while 59.8% of users had used telehealth pre-COVID, only 19.4% utilized tele-mental health specifically, reflecting a narrower uptake for psychological services compared to general health consultations.

Hemdi [16] offered insight into alternative digital solutions, showing strong user engagement with WhatsApp-delivered psychoeducation among mothers of children with autism.

Table 4. Service Utilization Impact

Study	Intervention Type	Utilization measures	Patient Satisfaction	Regional Coverage
Alharbi et al. [1], 2025a	Saudi Mental Health Access and Referral Centralized electronic referral	10,033 referrals; Western region 45.17%	Not reported	National, regional disparities
Alharbi et al. [13], 2025b	Saudi Mental Health Access and Referral Centralized electronic referral	82.5% acceptance	Not reported	National, regional/age differences
Alhalawany et al. [14], 2024	Online therapy	Increased use during COVID-19	Positive experience	Riyadh
Alomari and Jenkins [15], 2021	Seha application	Increased use in emergencies	Not reported	Jeddah
Alshareef and Alwabel [18], 2024	Sehhaty, phone/video	Over 1 million virtual consultations; Over 90% prefer virtual	97.4% satisfaction	National, rural/urban
Sayed et al. [17], 2025	Telehealth (various)	59.8% used pre-COVID; 19.4% tele-mental health	76.4% easy to use, 60.1% satisfaction	National, central region higher
Hemdi [16], 2017	WhatsApp psychoeducation	Not reported	Positive engagement	National

4. DISCUSSION

The systematic review on the impact of DMHIs on disparities in mental health service utilization in Saudi Arabia reveals significant findings that align with, and sometimes contrast, existing literature. The study highlights the transformative potential of DMHIs in addressing accessibility, stigma, and regional inequities, while also underscoring persistent challenges such as digital literacy gaps and infrastructure limitations.

The review demonstrates that DMHIs, such as the Saudi SMARC system, have significantly improved mental health service utilization, with over 10,000 referrals recorded and an 82.5% acceptance rate [1,13]. However, regional disparities persist, with urban areas like Riyadh and Jeddah accounting for nearly half of all referrals, while rural regions remain underserved. The COVID-19 pandemic further catalyzed the adoption of online therapy in urban centers, as evidenced by Alhalawany et al. [14], but rural areas lagged due to infrastructural deficits.

These findings align with global studies showing that telepsychiatry and e-referral systems enhance accessibility, particularly in remote regions [20]. For instance, Alghamdi et al. [21] found that telepsychiatry reduced waiting times in rural Saudi Arabia, corroborating the efficacy of digital solutions. However, the persistent urban-rural divide contrasts with studies from high-income countries like the U.S., where telehealth adoption has been more evenly distributed due to robust digital infrastructure [22]. This discrepancy underscores the need for targeted investments in Saudi Arabia's rural digital infrastructure.

The SMARC system's AI-driven predictive analytics [1] represent a novel approach to addressing regional disparities. Future research should explore how AI can optimize resource allocation by predicting demand in underserved areas, a strategy yet to be fully leveraged in mental health care [9].

DMHIs mitigated stigma by offering anonymity, with 97.4% of users expressing satisfaction with virtual consultations [18]. Culturally adapted interventions, such as gender-segregated platforms and religiously sensitive content, were particularly effective [19]. However, deep-seated stigma still limits engagement in conservative communities, especially among women [23]. The stigma-reducing role of DMHIs is consistent with global evidence. Lustgarten et al. [24] found that digital privacy encourages help-seeking behaviors. However, Saudi Arabia's sociocultural context introduces unique challenges. While a systematic review by Zolezzi et al. [25] noted stigma as a universal barrier in Arab cultures, another Saudi study emphasize the need for localized solutions, such as integrating family-centric designs into DMHIs to align with collectivist norms [4].

The success of WhatsApp-based psychoeducation suggests that low-tech, asynchronous tools may bridge gaps for populations wary of high-tech solutions. This aligns with Kozelka et al. [26]'s argument that *"digital divides"* are not just about access but also about comfort with technology. Future interventions could combine low-tech platforms with community-based stigma reduction campaigns, a hybrid approach yet to be widely tested in Saudi Arabia.

Barriers included digital literacy gaps, privacy concerns, and uneven internet access. Rural areas faced compounded challenges, with only 15% of SMARC referrals originating from these regions [1]. These challenges are consistent with global trends. Robinson et al. [8] identified digital literacy as a critical barrier in the U.S., while Koh et al. [27] highlighted privacy concerns as a universal deterrent. However, Saudi Arabia's rapid digital transformation, evidenced by Sehhaty's 1 million consultations [18], contrasts with slower adoption in other Arab Gulf countries, where regulatory hurdles persist [28].

The review identifies a tension between rapid technological adoption and equitable access. For instance, while AI-powered platforms like SMARC are advanced, their reliance on high-speed internet exacerbates rural disparities. This supports Al-Kahtani et al. [29]'s call for "inclusive digital health policies." It is recommended to pilot offline-capable DMHIs (e.g., SMS-based interventions) in rural areas, a strategy successfully implemented in low-resource settings globally [30].

This systematic review underscores the need for infrastructure investment, culturally tailored designs, and digital literacy programs. Policymakers must address the urban-rural divide and ensure gender-sensitive interventions. Similar recommendations appear in global literature. For example, Philippe et al. [9] advocate for policy frameworks to support DMHI scalability. However, Saudi Arabia's centralized health system offers unique opportunities for nationwide implementation, as seen with SMARC [13]. This contrasts with fragmented systems like that of the the U.S., where telehealth policies vary by state [22]. The review highlights the need for integrating DMHIs with existing community-based programs (e.g., National Center for Mental Health Promotion) to enhance reach. This aligns with another study by Alangari's [10] emphasizing on multi-sector collaboration. Additionally, leveraging Saudi Arabia's high smartphone penetration (95%) for mHealth campaigns [31] could bypass internet barriers, a strategy underutilized in current policies.

While the review provides robust evidence, limitations include reliance on cross-sectional studies and underrepresentation of qualitative insights from rural populations. Future research should employ longitudinal designs to assess DMHIs' long-term impact and explore hybrid (digital + in-person) models.

5. CONCLUSION

This review confirms that DMHIs hold immense promise for reducing mental health disparities in Saudi Arabia, particularly in enhancing accessibility and reducing stigma. However, their success hinges on addressing infrastructural and sociocultural barriers. By integrating global best practices with localized innovations, such as AI-driven resource allocation and low-tech solutions, Saudi Arabia can pioneer equitable digital mental health care. Policymakers must prioritize inclusive strategies to ensure no population is left behind in the digital transformation.

REFERENCES

[1] Alharbi AA, Aljerian NA, Binhotan MS, et al.: Digital Surveillance of Mental Health Care Services in Saudi Arabia: Cross-Sectional Study of National e-Referral System Data. JMIR Public Health Surveill. 2025, 11:e64257–e64257. 10.2196/64257

[2] Al-Habeeb A, Altwaijri YA, Al-Subaie AS, et al.: Twelve-month treatment of mental disorders in the Saudi National Mental Health Survey. Int J Methods Psychiatr Res. 2020, 29:e1832. 10.1002/mpr.1832

[3] Altwaijri Y, Kazdin AE, Al-Subaie A, et al.: Lifetime prevalence and treatment of mental disorders in Saudi youth and adolescents. Sci Rep. 2023, 13:6186. 10.1038/s41598-023-33005-5

[4] Aldaweesh S, Alateeq D, Van Kleek M, Shadbolt N: “If Someone Walks In On Us Talking, Pretend to be My Friend, Not My Therapist": Challenges and Opportunities for Digital Mental Health Support in Saudi Arabia. In: Proceedings of the CHI Conference on Human Factors in Computing Systems. ACM: Honolulu HI USA; 2024. 1–19.10.1145/3613904.3642642

[5] Alattar N, Felton A, Stickley T: Mental health and stigma in Saudi Arabia: a scoping review. Ment Health Rev J. 2021, 26:180–96. 10.1108/MHRJ-08-2020-0055

[6] Almubarak L, A Alhabeeb A: The Mental Health System in the Kingdom of Saudi Arabia. J Biomed Res Environ Sci. 2024, 5:773–8. 10.37871/jbres1954

[7] Alharbi AA, Aljerian NA, Binhotan MS, et al.: Acceptance of electronic referrals across the Kingdom of Saudi Arabia: results from a national e-health database. Front Public Health. 2024, 12:1337138. 10.3389/fpubh.2024.1337138

[8] Robinson A, Flom M, Forman-Hoffman VL, et al.: Equity in Digital Mental Health Interventions in the United States: Where to Next? J Med Internet Res. 2024, 26:e59939. 10.2196/59939

[9] Philippe TJ, Sikder N, Jackson A, Koblanski ME, Liow E, Pilarinos A, Vasarhelyi K: Digital Health Interventions for Delivery of Mental Health Care: Systematic and Comprehensive Meta-Review. JMIR Ment Health. 2022, 9:e35159. 10.2196/35159

[10] Alangari AS: Mental Health Service Use in the Kingdom of Saudi Arabia. 2020. 10.33915/etd.7756

[11] Liberati A, Altman DG, Tetzlaff J, et al.: The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. J Clin Epidemiol. 2009, 62:e1–34. 10.1016/j.jclinepi.2009.06.006

[12] JBI: Critical Appraisal Tools. Accessed: June 7, 2023. https://jbi.global/critical-appraisal-tools.

[13] Alharbi A, Aljerian N, Alghamdi H, et al.: Assessing Mental Illness Referral Request Acceptance: A Nationwide E-Referral Data From Saudi Arabia. J Multidiscip Healthc. 2025, Volume 18:735–45. 10.2147/jmdh.s493246

[14] Alhalawany RM, Alfaifi RM, Alzahrani RY, Alshehri FY, Alfaris DA, Taha MM: Impact of COVID-19 on the use of online mental health services among adults in Riyadh: a cross-sectional study. Eur Rev Med Pharmacol Sci. 2024, 28:1135–43. 10.26355/eurrev_202402_35352

[15] ALOmari MO, Jenkins J: Exploring the Attitudes of Patients towards using the Seha Application (Telehealth) in Saudi Arabia during the Coronavirus Epidemic. ABC J Adv Res. 2021, 10:9–22. 10.18034/abcjar.v10i1.545

[16] Hemdi A: The effectiveness of a psychoeducation intervention delivered via WhatsApp for mothers of children with autism spectrum disorder (ASD) in the Kingdom of Saudi Arabia. 2017.

[17] Sayed SH, Aldailami DA, Abd El Aziz MM, Elsayed EA: Perceived Telehealth Usability for Personalized Healthcare Among the Adult Population in Saudi Arabia: A Cross-Sectional Study in the Post-COVID-19 Era. Healthcare. 2025, 13:62. 10.3390/healthcare13010062

[18] AlShareef SM, AlWabel AA: Patient Opinions about Virtual Consultations in Saudi Arabia: A Nationwide Cross-Sectional Study. Healthcare. 2024, 12:1001. 10.3390/healthcare12101001

[19] Alkhalifah S, Aldhalaan H: Telehealth Services for Children With Autism Spectrum Disorders in Rural Areas of the Kingdom of Saudi Arabia: Overview and Recommendations. JMIR Pediatr Parent. 2018, 1:e11402.

10.2196/11402

[20] Wind TR, Rijkeboer M, Andersson G, Riper H: The COVID-19 pandemic: The 'black swan' for mental health care and a turning point for e-health. Internet Interv. 2020, 20:100317. 10.1016/j.invent.2020.100317

[21] Alghamdi SA, Alshahrani OM, Alharbi AK, Alghamdi OA, Almohaini RA, Alsayat JY: Telepsychiatry: knowledge, effectiveness, and willingness; assessments of psychiatrists in Saudi Arabia. Neurosciences. 2022, 27:79–86. 10.17712/nsj.2022.2.20210125

[22] Morales DA, Barksdale CL, Beckel-Mitchener AC: A call to action to address rural mental health disparities. J Clin Transl Sci. 2020, 4:463–7. 10.1017/cts.2020.42

[23] Noorwali R, Almotairy S, Akhder R, et al.: Barriers and Facilitators to Mental Health Help-Seeking among Young Adults in Saudi Arabia: A Qualitative Study. Int J Environ Res Public Health. 2022, 19:2848. 10.3390/ijerph19052848

[24] Lustgarten SD, Garrison YL, Sinnard MT, Flynn AW: Digital privacy in mental healthcare: current issues and recommendations for technology use. Curr Opin Psychol. 2020, 36:25–31. 10.1016/j.copsyc.2020.03.012

[25] Zolezzi M, Alamri M, Shaar S, Rainkie D: Stigma associated with mental illness and its treatment in the Arab culture: A systematic review. Int J Soc Psychiatry. 2018, 64:597–609. 10.1177/0020764018789200

[26] Kozelka EE, Acquilano SC, Al-Abdulmunem M, Guarino S, Elwyn G, Drake RE, Carpenter-Song E: Documenting the digital divide: Identifying barriers to digital mental health access among people with serious mental illness in community settings. SSM - Ment Health. 2023, 4:100241. 10.1016/j.ssmmh.2023.100241

[27] Koh J, Tng GYQ, Hartanto A: Potential and Pitfalls of Mobile Mental Health Apps in Traditional Treatment: An Umbrella Review. J Pers Med. 2022, 12:1376. 10.3390/jpm12091376

[28] Alanazi TNM, McKenna L, Buck M: The Nature and Availability of Mental Health Services in Arab Gulf Countries: A Scoping Review. Saudi J Health Syst Res. 2023, 3:10–34. 10.1159/000531699

[29] Al-Kahtani N, Alrawiai S, Al-Zahrani BM, et al.: Digital health transformation in Saudi Arabia: A cross-sectional analysis using Healthcare Information and Management Systems Society' digital health indicators. Digit Health. 2022, 8:205520762211177. 10.1177/20552076221117742

[30] Atallah N, Khalifa M, El Metwally A, Househ M: The prevalence and usage of mobile health applications among mental health patients in Saudi Arabia. Comput Methods Programs Biomed. 2018, 156:163–8. 10.1016/j.cmpb.2017.12.002

[31] Alodhialah AM, Almutairi AA, Almutairi M: Telehealth Adoption Among Saudi Older Adults: A Qualitative Analysis of Utilization and Barriers. Healthcare. 2024, 12:2470. 10.3390/healthcare12232470