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3 **Digitalisation provisions for controlling depression in developing**  
4 **countries: short review**

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11 **Abstract**

12 Depression is a global health issue which is associated with disability,  
13 absenteeism, decreased productivity and high suicide rates. It is the fourth most  
14 common cause of disability globally and by the year 2020 it will be the second  
15 leading cause of disease burden. In Pakistan, the prevalence of depression is  
16 45.9%. A unique and promising method for addressing the issue is mobile  
17 health (m-health). It refers to the utilisation of mobile technology to support  
18 various aspects of healthcare. Electronic record, SMS, internet, wearable  
19 devices and mobile applications are some of the digitalisation approaches used  
20 to bridge the treatment gap in depression through assuring privacy of patients,  
21 improving accessibility, reducing taboos related to depression, save cost for  
22 patients and reduce hospital burden and consultation time; these will be  
23 accessible in remote areas as well. Therefore, this short review is aimed to  
24 highlight the m-health forecasting for controlling depression and positional use  
25 in developing countries.

26 **Keywords:** Digitalisation, Depression and M-health.

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## 29 **Introduction**

30 Mental health has become a global health issue affecting different age groups  
31 and socioeconomic backgrounds.<sup>(1, 2)</sup> Globally, mental and behavioural illnesses  
32 account for 7.4% of disability-adjusted life years (DALYs). With escalation in  
33 cases of depression to 38% since 1990, depressive disorders ranked as 11th  
34 highest cause of DALYs.<sup>(2)</sup> Depression is one of the most common recurrent  
35 mental disorders that affect both the mind and body and leads to decreased  
36 productivity, workplace absenteeism and high suicide rate.<sup>(3-7)</sup> It is the fourth  
37 most common cause of disability and by the year 2020 it will be the second  
38 leading cause of disease burden globally.<sup>(8)</sup>

39 A cross-national research in developing countries revealed that prevalence of  
40 depression in urban Pakistan was 45.9%,<sup>(9)</sup> 29% in rural Bangladesh,<sup>(10)</sup> 6.1% in  
41 a peri-urban clinic of Uganda<sup>(11)</sup> and 63.2% in India.<sup>(8, 12)</sup> Factors such as low  
42 income, unavailability of insurance, timeliness, privacy and stigma attached to  
43 psychiatric illnesses, lead to scarce and unfair psychiatric resources. These  
44 factors also create barriers for patients limiting access to treatment and  
45 decreasing their retention in treatment.<sup>(13)</sup> Therefore, there is a need for some  
46 unique strategy for addressing mental illness.

47 In 2008, the first m-health application software became available, and since then  
48 more than 10,000 applications have been developed for smart phones.<sup>(14)</sup> Of  
49 these apps, 6% are purely used to evaluate mental health outcomes.<sup>(14, 15)</sup> Mobile  
50 phones and apps signify an opportunity to screen and intervene depressive  
51 patients.<sup>(16, 17)</sup> Various studies conducted in Western countries regarding mobile  
52 health intervention for depression show that this technology provides the facility  
53 of delivering interactive tools for depressive patients in their environment —  
54 also called ecological momentary intervention.<sup>(18)</sup>

55 To meet the Sustainable Development Goal (target 3.8) of good health and well-  
56 being, which asks for an end to communicable diseases, achieving universal  
57 health coverage, and providing access to safe and effective medicines and

58 vaccines by 2030,<sup>(19)</sup> need innovative solution. Globally the uptake of  
59 digitalisation has been a remarkable impact on the healthcare delivery system.  
60 Digitalisation approaches include electronic record, tele-health, SMS, internet,  
61 wearable, devices, mobile health, and mobile applications, and offers to bridge  
62 the gap in the treatment of depression by providing access to information on  
63 depression and encouraging health seeking behaviour.<sup>(20)</sup> Electronic health  
64 provides enriched medium for information and communication that can be  
65 transferred.<sup>(21)</sup> Mobile applications allow global access, empowering assessment  
66 of patients with depression and other mental illnesses.<sup>(16)</sup> E-health also  
67 overcomes multiple barriers in treatment, including cost, timeliness and  
68 concerns regarding confidentiality therefore levels of satisfaction is high among  
69 patients with E-mental health programme as a self-care digital tool.<sup>(17)</sup>

70 The studies included in this review make use of digitalisation for depressive  
71 patients in our country. This innovation will help us in detecting actual and  
72 hidden cases of depression as there is a stigma associated with this illness.  
73 Furthermore, early screening and diagnosis of cases is also possible which helps  
74 in prompt and optimised treatment. Moreover, it assures the privacy of patients,  
75 saves travel cost, consultation time and is also accessible in remote areas. Thus,  
76 there is a dire need for m-health /digitalisation services in our region that will  
77 lessen public health burden, hospital cost and stay. Therefore, the current study  
78 is designed to emphasise m-health opportunities and prospects that should be  
79 utilised for depressive patients in Pakistan. Therefore, this short review is aimed  
80 to highlight the m-health forecasts for depression as there is a dearth of using  
81 this innovation in developing countries, and its impact on sustainable  
82 development goals.

83 An initial literature review was carried out to develop this report. The idea of  
84 this short review came when one of the authors working at the Aga Khan  
85 Development Network's eHealth Resource Centre (AKDN eHRC) was applying  
86 this technology for maternal health of patients in remote and rural settings of

87 lower-middle income countries. It was a unique programme, helped to  
88 overcome the three major challenges for providing healthcare — access, quality  
89 and cost — in low-resource settings through Information Communication  
90 technology such as tele-consultations and eLearning sessions. The intention was  
91 not to do a systematic review of all the available literature, rather selected  
92 articles were reviewed for building this paper. This paper focus on  
93 digitalisation, its roots in the public health perspective of depression and its  
94 reduction.

95 The role of m-health is evident in the developed world. Examples of such  
96 interventions include ‘Mobilyze’, an app to target depression; it provides  
97 ecological momentary intervention in which context-aware system detects  
98 participants’ location, activity, social context, mood and emotions.<sup>(18)</sup> Likewise  
99 another intervention app, ‘SituMan’ provides situation awareness.  
100 ‘MoodBuster’, an ecological momentary assessment and intervention mobile  
101 application, is used for self-assessment of depressive patients.<sup>(13)</sup> A randomised  
102 trial on young adults (YAs) revealed that eSMART –MH was based on critical  
103 parameters such as necessity, acceptability, fidelity, and safety. However,  
104 feasibility findings were mixed.<sup>(22)</sup> A study conducted in Australia, Canada,  
105 New Zealand, and the United Kingdom included 2,538 participants who  
106 monitored depression with the help of mobile phone app.<sup>(23)</sup> Of the participants,  
107 322 participants had severe depressive symptoms that were undiagnosed  
108 previously and were directed through an app to seek immediate advice from  
109 healthcare provider. Moreover, a follow-up message was also sent to them after  
110 one month for advice from healthcare professional through mobile phone. The  
111 study revealed that around 74% of the participants who had severe scores  
112 completed the follow-up.<sup>(23)</sup> Another study conducted in China showed that a  
113 smartphone application called iHope was used to perform daily ecological  
114 momentary assessment (EMA) of different mental illnesses, including  
115 depression, in outpatients. This study revealed the viability of smartphone-based

116 EMA in patients with depression.<sup>(24)</sup> A study conducted in Kenya used mobile  
117 based mental health Global Action Intervention Guide (mhGAP-IG )for  
118 depression.<sup>(25)</sup> This study concludes that the use of mobile-based guide in  
119 remote healthcare settings is important because mostly non-mental healthcare  
120 specialists tackle all mental health problems. This mobile-based mhGAP-IG  
121 screening save travel cost, consultation time and utilisation of evidence-based  
122 screening tool.<sup>(25)</sup>

123 The “Kokoro” app is a smartphone-based Cognitive Behaviour Therapy (CBT)  
124 program which has shown viability and suitability of therapy for treatment-  
125 resistant depression.<sup>(26)</sup> Moreover, the “myCompass” is another programme for  
126 different mental illnesses, including mild to moderate depression, that track  
127 symptoms and give medication reminders.<sup>(27)</sup> Tele-mental health has widely  
128 been used for the benefit of patients with depression.<sup>(28)</sup> Moreover, improvement  
129 in symptoms of depression due to tele-mental health than in-person groups is  
130 also reported.<sup>(28)</sup> Another study conducted in community clinics also revealed  
131 that patients’ access improved in depression-specific care using tele-  
132 psychiatry.<sup>(29)</sup> Studies have also pointed out that utilisation of tele-psychiatry  
133 can help in long-term cost savings.<sup>(30)</sup>

134 This short review concluded that mobile phones have reached almost all strata  
135 of the world and provide such treatment platform that build continuous two-way  
136 connection between the patient and healthcare staff. Mobile technology helps in  
137 monitoring an individual’s physiological and psychological state. The use of  
138 this technology in healthcare interventions may lessen the rising trend of  
139 healthcare costs that ultimately improve access to health services. Thus,  
140 digitalisation should be made use of in developing countries for depressive  
141 patients, particularly in Pakistan.

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