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Author manuscript

*Harv Rev Psychiatry*. Author manuscript; available in PMC 2022 June 02.

Published in final edited form as:

*Harv Rev Psychiatry*. 2021 ; 29(4): 262–277. doi:10.1097/HRP.0000000000000306.

## Leveraging Systems Science to Promote the Implementation and Sustainability of Mental Health and Psychosocial Interventions in Low- and Middle-Income Countries

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### Abstract

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**Declaration of interest:** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Supplemental digital contents are available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site ([www.harvardreviewofpsychiatry.org](http://www.harvardreviewofpsychiatry.org)).

Advancements in global mental health implementation research have revealed promising strategies for improving access to evidence-based mental health care. These advancements have not translated, however, into a reduced prevalence of mental disorders. In this review we examine the relationships between determinants (i.e., barriers and facilitators) and outcomes of mental health services in low- and middle-income countries to identify opportunities for improving the population-level impact and sustainability of innovations in global mental health. We identified three key implementation and services outcomes that influenced the prevalence of mental disorders in the 56 included review articles: supply (access, implementation), demand (help seeking, utilization), and quality (effectiveness, quality of care) of mental health services. Determinants of these outcomes revealed seven themes: community stakeholder engagement; cultural relevance; stigma; human resource capacity; organization of services; governance, policy, and financing; and sociopolitical and community context. We developed a causal loop diagram to illustrate the relationships among these determinants and outcomes. The causal loop diagram revealed the central role of community stakeholder engagement in bridging implementation and patient outcomes, the importance of addressing stigma and social determinants of mental health, and the need to complement supply-side implementation strategies with approaches to equilibrate demand and improve the quality of services. Applying systems science methodologies to global mental health research presents an opportunity to examine the complex relationships among community and health system factors that influence implementation of evidence-based interventions in order to identify sustainable approaches to improve the population-level impact of mental health services in low- and middle-income countries.

### Keywords

causal loop diagram; global mental health; implementation science; mental health services; systems science

## INTRODUCTION

Mental disorders are among the leading contributors to the global burden of disease.<sup>1</sup> The global lifetime and past-year prevalence of common mental and substance use disorders are estimated to be 29% and 18%, respectively.<sup>2</sup> Yet, the treatment gap, defined as “the absolute difference between the true prevalence of disorder and the treated proportion of individuals affected by the disorder”<sup>3</sup>—exceeds 50% in most countries.<sup>3</sup> In low and middle-income countries, the treatment gap often exceeds 90%.<sup>4</sup> This excess burden has stimulated increased investment in global mental health implementation research intended to reduce the treatment gap, improve the quality of mental health services, and increase demand for care, thereby reducing the community prevalence of mental disorders.<sup>5,6</sup> Despite growing evidence supporting the effectiveness of mental health services<sup>7</sup> and the ability of innovative implementation strategies to increase access to care, these discoveries have not translated into a reduction in the prevalence of mental disorders at the population level.<sup>8</sup> This may be explained, in part, by challenges translating into practice the evidence generated through rigorously controlled research studies.<sup>9</sup>

Research on barriers and facilitators of mental health services implementation in low-resource settings has advanced our understanding of the common challenges that exist at the patient, provider, intervention, organization, community, and sociopolitical levels.<sup>10,11</sup> Research on the relationships among these determinants remains limited, however, particularly in the context of advancing health equity in settings that face structural and social barriers to implementing mental health services. The majority of strategies developed and tested globally in response to common barriers to implementation of mental health services have focused on increasing access to care through task sharing, capacity building, and service integration.<sup>12–14</sup> Although these strategies are necessary for reducing the treatment gap, particularly in low-resource settings (where the treatment gap is the largest),<sup>4</sup> they may not be sufficient solutions to sustainably reduce the prevalence of mental disorders in complex and dynamic settings over time.

Sustainability of mental health services is defined as continued delivery and behavior change that is maintained beyond the initial period of implementation and continues to produce benefits for patients, communities, and health systems.<sup>15</sup> Although sustainable mental health services may evolve over time to meet changing local needs and resources, they ultimately continue to be delivered and benefit the community and system within which these services are implemented. To increase the likelihood of the sustainability of evidence-based mental health interventions and their population-level impact on health outcomes, strategies must address the multilevel, time-varying, and interrelated determinants of implementation and mental health outcomes. Failing to account for the ways in which communities and system-level factors interact over time in complex systems may explain, in part, why we have not observed an enduring decline in the burden of mental disorders at the population level despite efforts to increase the availability of evidence-based services.<sup>16</sup>

*Systems science* is a discipline that has developed translational methods aimed to understand the behavior of complex systems, including how specific components of a system behave in relation to other components over time.<sup>17</sup> Integrating principles of systems science into global mental health implementation research provides tools to anticipate emergent barriers and unintended consequences of interventions that hamper their long-term public health impact and to identify novel opportunities to intervene that may more efficiently reduce the burden of mental disorders.<sup>18</sup> Applying these methods to understand the relationships among determinants of implementation may enable identification of efficient leverage points to improve the delivery and sustainability of mental health services in low-resource settings facing a complex network of implementation challenges amid a scarcity of services.<sup>10</sup> The objective of this study is to characterize the relationships among common determinants (i.e., barriers and facilitators) and implementation outcomes of mental health services in low- and middle-income countries in order to explore how these relationships may affect the sustainability of services and the prevalence of mental disorders over time. By characterizing these relationships, we aim to identify key implementation processes that are critical to reducing the burden of mental disorders.

## METHODS

As described in Supplemental Table 1, <http://links.lww.com/HRP/A162>, we first conducted a review of reviews to compile a comprehensive list of barriers and facilitators to implementing mental health services in low- and middle-income countries. We developed a search strategy for PubMed/MEDLINE that included terms related to mental disorder, intervention implementation, barriers and facilitators, and low- and middle-income countries (the full search strategy and flow diagram are provided in Supplemental Figures 1, <http://links.lww.com/HRP/A164>, and 2, <http://links.lww.com/HRP/A165>). Eligible articles included any type of review that presented challenges, barriers, or facilitators to implementing interventions for common and severe mental disorders, substance use disorders, or mental disorders more generally in low- and middle-income countries. Low- and middle-income countries were defined using the World Bank's country and lending groups.<sup>19</sup> We extracted information on determinants of mental health services implementation and the relationship between determinants from included studies, which are detailed in Supplemental Table 2, <http://links.lww.com/HRP/A163>.<sup>10,11,20–73</sup> Determinants were defined as the barriers and facilitators of mental health services implementation. Barriers and facilitators identified in the review were categorized by at least two authors independently according to the domains described in the *integrated sustainability framework* (ISF).<sup>74</sup> This framework was chosen because it includes domains common across implementation frameworks (e.g., inner and outer context) while also framing these domains as determinants of sustainability. Discrepancies were resolved through discussion. We also extracted information on the antecedents and consequences of barriers and facilitators described in this review to elucidate potential causal pathways among barriers, facilitators, and implementation outcomes.

We transcribed the determinants of mental health services implementation that were extracted from the review articles onto notecards and arranged them on a large whiteboard. We drew arrows from antecedents to barriers/facilitators as well as from barriers/facilitators to consequences in order to display causal sequences of determinants and outcomes as they were described in the review articles. A simplified electronic depiction of the resulting *interrelationship digraph* (IRD) is provided in Supplemental Figure 3, <http://links.lww.com/HRP/A176>, for illustrative purposes. We examined the IRD to identify key implementation, services, and patient outcomes that were influenced by the determinants identified in this review. Causal sequences that were not linked (directly or indirectly) to key mental health services outcomes were omitted from the final IRD. We examined the IRD to identify emergent categories of determinants that were then used to organize the barriers and facilitators within the ISF domains.

We then constructed a theoretical framework informed by the ISF and Proctor's implementation outcomes that included the key outcomes and determinant categories identified in the IRD.<sup>74,75</sup> To elaborate the theoretical framework and IRD into a *causal loop diagram*, we examined the IRD to identify determinants that displayed linkages to the outcomes included in the theoretical framework directly or indirectly via other determinants. We positioned these determinants in relation to the implementation, services, and patient outcomes as they were displayed on the IRD, and began to elaborate this model with causal

feedback loops. Causal loops were pathways identified from the IRD (i.e., as described in the included review articles) that linked a series of determinants to the implementation, services, and patient outcomes and that fed back into the original determinant to produce a closed feedback loop. The direction of the arrows in the causal loop diagram indicates the directionality of the association between determinants or outcomes as described in the included studies. The polarity of each relationship was noted using a positive sign (+), indicating a positive association, or a negative sign (–), indicating an inverse association between the two constructs linked in the causal loop diagram. For example, a positive arrow linking risk factors to mental disorder may indicate that higher levels of the risk factor in the population will yield a higher prevalence of mental disorder. Conversely, a negative arrow linking implementation barriers to delivery of services would describe that greater implementation barriers result in a reduction in delivery of mental health services. Then, each feedback loop was defined as either a *reinforcing* (R) or *balancing* (B) loop. Reinforcing loops are amplifying processes whereby changes in the determinants and outcomes described in the loop result in an exponential growth or decline unless regulated by external forces. Balancing loops are self-regulating processes that limit growth or maintain equilibrium of a process, leading to a plateau or steady state over time.<sup>76,77</sup> The direction and polarity of the arrows together determine the type of feedback loop (i.e., reinforcing or balancing), which can be used to understand how these processes collectively influence implementation outcomes. The elaborated causal loop diagram was then evaluated by study authors to determine whether the relationships were consistent with scientific knowledge and applied experience. Study authors reviewed the logic underlying each causal loop and iteratively refined the causal loops until they best reflected both the data extracted from the review articles and the study authors' knowledge and experience.

## RESULTS

We retrieved 6180 articles from our search conducted in PubMed/MEDLINE (see Supplemental Figure 2, <http://links.lww.com/HRP/A165>). Four hundred ninety-four articles were excluded at the title/abstract screening stage because they were not review articles. The remaining 5594 articles excluded at the title/abstract phase either did not reference a mental health intervention/service in the title/abstract or were not conducted in a low- or middle-income country. Ninety-two articles were eligible for full text review. Twenty articles were excluded because they were not review articles, and seven review articles were excluded because they did not include studies in low- and middleincome countries. Fifty-six review articles reporting on barriers and facilitators to mental health programs in low- and middleincome countries were included in this review. The types of review article varied across studies and were described as critical reviews, desk reviews, literature and document reviews, narrative reviews, nonsystematic reviews, rapid appraisal reviews, review of government documents and guidelines, scoping reviews, and systematic reviews that sometimes included a meta-analysis.

The majority of these studies reported on mental health programs in low- and middle-income countries generally.<sup>10,11,20,23,27,29–31,37–39,41,42,44,47,49,51,52,54,56,58,60,61,63,73</sup> Other reviews focused on specific continents (Africa,<sup>32,36,64</sup> Asia<sup>28,68</sup>), countries or sovereign states (Brazil,<sup>33</sup> China,<sup>50,53</sup> Colombia,<sup>72</sup> Georgia,<sup>55</sup> Ghana,<sup>46,59</sup> India,<sup>22,45</sup>

Jordan,<sup>48</sup> Kenya,<sup>66</sup> Lebanon,<sup>21,71</sup> Palestine,<sup>69</sup> Peru,<sup>43</sup> Philippines,<sup>70</sup> Solomon Islands,<sup>35</sup> South Africa,<sup>25,40</sup> Uganda<sup>34</sup>), regions (Latin America,<sup>57</sup> the Middle East,<sup>26,62</sup> countries neighboring Syria<sup>65</sup>), or specific contexts (humanitarian or conflict settings<sup>24,67</sup>). Most reviews focused on mental health programs intended for the general population,<sup>10,11,20–28,30–39,42–47,50–53,56–61,63,64,66,68–71</sup> whereas others focused on programs for children and adolescents,<sup>67,73</sup> conflict-affected populations,<sup>49</sup> refugees,<sup>48,62,65,72</sup> internally displaced persons,<sup>55,72</sup> or women during the perinatal period.<sup>29,41,54</sup> Most reviews presented challenges for implementing general mental health services, with some focusing on the use of specific strategies such as telemental health,<sup>28,44,60,62,71</sup> task sharing,<sup>27,29,30,36,47,50,54</sup> integrated services,<sup>10,42,61</sup> or communitybased approaches to improving mental health.<sup>32,37,41,46,52,59</sup> Most reviews focused on services for mental health problems generally, though some focused on services for specific disorders, including depression,<sup>29,41,54</sup> posttraumatic stress disorder,<sup>63</sup> schizophrenia and psychotic disorders,<sup>22,31,69</sup> or substance use disorders.<sup>49</sup>

### Key Barriers and Facilitators of Mental Health Services in Low- and Middle-Income Countries

We identified three implementation and mental health services outcomes in relation to the prevalence of mental disorders that were commonly influenced by the barriers and facilitators described in the included articles: (1) demand for services (e.g., help seeking, utilization, continued engagement, retention in care),<sup>10,11,21–26,28,32,37–39,41,44,51,56,57,62,65,68–71</sup> (2) supply of services (e.g., reach, access, implementation),<sup>10,20–24,26,29,30,32,34,36,39,43,44,46–52,54,55,57,58,61,63–67,69,71,72</sup> and (3) quality of services (e.g., effectiveness, quality of care).<sup>10,24,26,34,38,52,58,59</sup> We mapped the barriers and facilitators onto the domains of the ISF (Table 1).<sup>74</sup> The ISF is composed of outer contextual factors, inner contextual factors, interventionist/population characteristics, intervention characteristics, and processes—all of which interact dynamically to determine sustainable service delivery and health impact.

We stratified the barriers and facilitators within each of these domains by the three implementation and services outcomes (i.e., demand, supply, and quality of services; Table 1). Broadly, demand for mental health services was driven by characteristics of the population and outer context,<sup>11,21–26,28,29,31,32,38,39,47,56,57,62,68–70,72</sup> the relationship between communities and the health system/providers,<sup>25,26,39,50,57,65,68,70</sup> the sociocultural relevance of mental health interventions,<sup>26,29,41,42,44</sup> and processes for engaging diverse stakeholders in the implementation of mental health services.<sup>23,26,59</sup> The supply of mental health services, which included both access and implementation, was largely determined by outer and inner contextual factors. Supply of mental health services was influenced by the government's commitment to supporting mental health services through policies, plans, and resources.<sup>10,21,23,32,42,43,49–51,55,58,61</sup> Within the inner context, barriers such as poor health system infrastructure,<sup>10,27,33,46,51,64,66,67</sup> limited resources,<sup>10,22,23,26,31,51,55,63,69</sup> competing priorities,<sup>10,49,55</sup> and a toxic institutional climate<sup>10</sup> prevented delivery of mental health services. Having well-organized<sup>44,50</sup> and decentralized services<sup>23,46</sup> staffed by multidisciplinary and collaborative provider teams<sup>10,50,59,64</sup> facilitated the implementation of mental health services. Other processes, including coordination,<sup>10,61</sup> training and career



development opportunities for staff,<sup>10</sup> and engagement and collaboration among traditional healers, medical providers, governments, and service users,<sup>10,42,50</sup> facilitated access and implementation of mental health services. The quality of mental health services was the outcome with the fewest determinants described in the literature. Community trust in the mental health system, including providers and interventions,<sup>34,52</sup> and mechanisms to ensure accountability (e.g., monitoring, evaluation, and health information systems)<sup>34,55</sup> improved the quality of mental health services.

### **Relationships Between Barriers and Facilitators of Mental Health Services in Low- and Middle-Income Countries**

From the IRD we identified seven key categories of determinants that influenced the implementation of mental health services and the prevalence of mental disorders. These included the following: community stakeholder engagement; cultural relevance; stigma; human resource capacity; organization of services; governance, policy, and financing; and sociopolitical and community context. Together, these concepts represented determinants of mental health implementation and services outcomes across levels of the ISF (Table 1 and Figure 1).

At the center of the IRD were the core relationships describing the association between key implementation and services outcomes, which informed the theoretical framework. As specified in our study objective a priori, we added the primary patient outcome—the prevalence of mental disorders—to our theoretical framework. These relationships suggested that in contexts with a void of mental health services, help seeking (including continued help seeking [i.e., retention]) initially increased the supply of services. However, once supply meets this demand and reaches an equilibrium (i.e., the treatment gap is reduced), greater supply will ultimately be associated with less demand. Demand for mental health services also led to increased quality of care; as a result, receipt of effective mental health services reduced the prevalence of mental disorders and subsequent treatment demand (bolded arrows, Figure 2/Supplemental Figure 4, <http://links.lww.com/HRP/A178>). We identified 13 feedback loops that explained and expanded upon the associations described in our theoretical framework (Figure 2/Supplemental Figure 4, <http://links.lww.com/HRP/A178>; see Text Box 1 for description of causal loops).

**Relationship between supply and demand for mental health services**—The relationship between supply and demand for services was largely explained by two distinct processes. First, the availability of human resources for mental health was identified as a critical determinant of access to, and implementation of, mental health services. A shortage of providers was exacerbated by high treatment demand, which led to provider strain and turnover. Training and capacity building strengthened provider competency, motivation, and self-efficacy, thereby mitigating staff turnover and improving access to mental health care. Another mechanism describing the relationship between supply and demand for mental health services was community stakeholder engagement. The demand for mental health services stimulated community stakeholder engagement, increasing the relevance, acceptability, and efficiency of mental health services and mobilizing multisectoral stakeholders and resources to improve access to, and quality of, mental

health services. There was also a reciprocal relationship whereby increased stakeholder engagement amplified demand for mental health services.

**Prevalence of mental disorders and the supply of, and demand for, mental health services**—Social and structural stigma were key determinants of demand for mental health services. Social problems, discrimination, inequality, and setting insecurity increased the prevalence of mental disorders while also weakening health systems and infrastructure, which compromised supply of mental health services. These sociopolitical and contextual adversities were exacerbated by social stigma, which reduced demand for services. Since this review focused on collecting determinants of *implementation*, not all determinants of the prevalence of mental disorders are included in the causal loop diagram; *risk factors and protective factors* are included in the causal loop diagram as a single exogenous determinant representing the numerous biopsychosocial factors that contribute to the prevalence of mental disorders beyond the implementation determinants.

**Improving the quality of mental health services**—Finally, the causal loop diagram describes the capacity of governments, coupled with a political commitment to mental health (which is often stimulated by community-level advocacy), to enact mental health policies and plans, dedicate funding and resources, strengthen health systems, and develop mental health information systems to promote accountability of the health system. The quality of mental health services was also influenced by community ownership of mental health services, which involved community trust, buy-in, and the inclusion of multiple health providers and healers (i.e., medical pluralism). These processes ultimately improved mental health services and outcomes.

## DISCUSSION

In this study we identified 56 reviews describing barriers and facilitators to mental health services in low- and middle-income countries. These results revealed notable consistencies in barriers and facilitators across reviews, which categorized as follows: stigma; cultural relevance; community stakeholder engagement; human resource capacity; organization of services; governance, policy, and financing; and sociopolitical and community context. These categories were developed based on themes that emerged across the determinants we identified and were consistent with findings from recent reviews examining implementation determinants of mental health programs in low- and middle-income countries using similar frameworks, such as the Consolidated Framework for Implementation Research.<sup>78</sup> For example, Esponda and colleagues (2020)<sup>10</sup> reported that resources (including human resource capacity), social needs, provider stigma, and the fit of mental health services were critical determinants of implementation in low- and middle-income countries. As recommended by Esponda and colleagues,<sup>10</sup> this study extends findings from previous reviews by applying systems thinking to understand the relationship among these determinants and implementation outcomes. Findings from this study reveal substantial complexity and multilevel interactions among these determinants that warranted a systems science approach to identify sustainable opportunities for improving the population-level impact of mental health and psychosocial services in complex, low-resource settings.



The causal loop diagram identified multiple leverage points for improving the population-level impact of mental health services. Leverage points in complex systems are considered “places within a complex system where a small shift in one thing can produce big changes in everything.”<sup>79</sup> These leverage points include strengthening community engagement and demand for mental health services, sustainable financing, capacity building, and alleviating social adversity and stigma. Capacity building was involved in multiple processes that influenced mental health implementation outcomes by increasing the number of trained providers, enabling decentralized and integrated service delivery models, and reducing provider stigma. The majority of global mental health implementation research has focused on increasing access to care through training and capacity building, which are essential strategies for improving mental health in settings with limited services and have been shown to be feasible in numerous low-resource settings.<sup>80</sup> Our causal loop diagram indicates that increased investment in improving demand for mental health care may yield stronger and more sustainable impacts because of its centrality and multi-finality within the system. This result is consistent with prior literature suggesting that, in order to reduce the community prevalence of mental disorders, efforts to increase supply and reduce the treatment gap must be complemented by strategies to increase help seeking and quality of care.<sup>6</sup> The difference between the biomedical model of mental health endorsed by most mental health specialists and the way in which psychological distress is experienced and understood in communities, referred to as the “credibility gap,” must be bridged in order to reduce the burden of mental health problems in communities.<sup>81</sup> The necessary strategies include many of the processes identified in the causal loop diagram, including: (1) ensuring cultural relevance and understanding local needs, (2) integrating services, not only within the health system, but across sectors, and (3) providing more holistic care to reduce distress that may not require specialized interventions.<sup>81</sup> Increasing demand for care may have a downstream impact on all aspects of the system, including, directly, by improving the quality and supply of services and, indirectly, via community engagement. Determinants of demand may be modified at the community and health-system levels through increases in the supply of mental health services, community engagement, and reductions in stigma, as well as further upstream factors.

Additionally, community stakeholder engagement displayed a reciprocal, reinforcing relationship with increased demand for mental health services. Community stakeholder engagement appears to be central to processes that increase demand for mental health care and that support the continued implementation and quality of mental health services to reduce the prevalence of mental disorders. The mechanisms through which community stakeholder engagement influences these processes include ensuring community needs are understood and acceptably addressed, increasing community trust and buy-in, including nontraditional stakeholders in mental health service delivery (e.g., nonmedical healers and religious healers) to promote culturally relevant and holistic care, and advocating for political prioritization of mental health services. This finding reveals the potential of a community-engaged, ground-up approach to changing the mental health system in an effort to promote impact and sustainability. Identifying this potential is consistent with calls to more meaningfully engage and empower communities to strengthen the relevance, impact, and sustainability of mental health services in low-resource settings.<sup>82</sup>

We identified other pathways to improving population-level mental health that have been underutilized and underdeveloped in global mental health implementation research. The most proximal determinants of the prevalence of mental disorders include stigma, social problems, and the quality of mental health services. The severity of social problems, which is driven by contextual instability and inequality, directly affected the prevalence of mental disorders. Inequality and discrimination are consequences of stigma and also determinants of mental health. Qualitative research in India found that psychological symptoms attributed to social adversity may also reduce demand for mental health services because of low perceived need, which suggests an additional pathway by which social adversity may reduce population mental health.<sup>83</sup> Social determinants of health and stigma must be considered when developing mental health initiatives that intend to have a population-level impact. Among the implementation and services outcomes that comprised the conceptual framework (Figure 1) and causal loop diagram, the quality of mental health services was the outcome with the fewest determinants that we identified in this review. The quality of mental health services is influenced by community buy-in and trust, medical pluralism (i.e., holistic care integrating multiple medical systems, such as Western and traditional medicine), the strength of the health system, and mental health information, monitoring, and evaluation systems. In an effort to uncover determinants of quality that were not identified through this literature review, future intervention and implementation research should explore strategies targeting these proximal determinants of mental health services quality.

Relative to the implementation and services outcomes included in our theoretical framework (supply of mental health services, demand for mental health services, and quality of mental health services), the sustainability of mental health services (defined here as continued delivery of mental health services beyond the initial period of implementation and continued patient and community benefit) was rarely reported as an outcome in the eligible review articles, providing further evidence that sustainability is an understudied outcome in global mental health implementation research. Sustainable funding and resources for mental health services emerged as necessary determinants for improving the population-level impact of mental health services. However, national health budgets often have limited, if any, resources earmarked for mental health.<sup>84</sup> Mental disorders receive less than one U.S. dollar of development assistance per disability-adjusted life year in low- and middle-income countries, which is significantly lower than most other disorder categories.<sup>85</sup> As observed in the causal loop diagram, financial resources increased access to care by building mental health services capacity, strengthening health systems to increase demand for services, and increasing the quality of services by supporting mental health information, monitoring, and evaluation systems. Without reliable financing, significant tradeoffs and compromises to supply and quality will arise and reduce the capacity to sustain the implementation of mental health services.<sup>86</sup> National health system strengthening initiatives in middle-income countries have identified lack of sustainable financing and low demand as the biggest threats to sustainability.<sup>87,88</sup> Identifying determinants of sustainable financing is needed to overcome this substantial bottleneck in mental health service delivery in low- and middle-income countries.<sup>89</sup> Community stakeholder engagement, mental health awareness, and political prioritization of mental health services were determinants of sustainable resources and funding identified in this review, and may be critical points of leverage to ensure that

financial resources are allocated appropriately to improve the sustainability and population-level impact of mental health services in low-resource settings. Taken together, the causal loop diagram reinforces that the whole of the system must be taken into consideration when making investment decisions.

The causal loop diagram enabled exploration of the potential impacts of changing system elements on sustainability of service delivery. One limitation, however, was that we were unable to capture qualitative changes in the nature (i.e., polarity) of the included relationships over time. For example, several included articles described the demand for mental health services increasing with supply in low-resource settings with a large treatment gap; this association may be true, however, only for settings with large treatment gaps due to a near absence of mental health services. As supply increases and a greater proportion of the demand for mental health services is met, the polarity of the relationship between supply and demand is expected to shift to one where increased supply reduces demand (i.e., reaches an equilibrium). Furthermore, as demand stabilizes and meets population needs, resources may be shifted elsewhere, leading to reduced supply and a resurgence of mental disorders. These scenarios have implications for sustainability. For instance, relying on training and capacity building as a singular strategy to improving population-level mental health may be compromised if mechanisms are not in place to regulate the initial increase in the demand for mental health care. In low-resource settings where the treatment gap is large enough that the relationship between the supply of, and demand for, services has not reached equilibrium, the overwhelming demand for mental health care may lead to provider burnout, attrition, and ultimately a shortage of mental health providers. Strategies that target implementation outcomes or demand for services under these conditions must supplement such efforts with strategies that provide support to providers and that increase the quality of services to ensure that the burden of mental disorders is ameliorated and that demand is regulated until the supply of services is able to accommodate the demand. To further explain the relationships depicted in this causal loop diagram, future research needs to use alternative system dynamics methods that allow these complex and nonlinear relationships to be represented as processes that drive the accumulation and depletion of constructs, such as the unmet demand for mental health services and the community prevalence of mental disorders,

Some important limitations of this review include that the data used for this study were restricted to peer-reviewed review articles indexed in PubMed. Therefore, this review did not include individual studies that were not captured in the eligible reviews and also did not include reviews from other databases or the gray literature. Despite this limitation, we identified substantial convergence and consistency of reported barriers and facilitators across studies, providing some evidence of saturation. The causal loop diagram reflects the information available in the current academic literature, which is likely to overrepresent treatment and specialized interventions. Group model-building approaches were designed to leverage community tacit knowledge.<sup>90</sup> Relying on published literature is unlikely to capture some barriers and facilitators that may be revealed through a participatory group model-building process, including non-biomedical approaches to promoting mental health, alleviating distress, or addressing disorder.<sup>91</sup> Further research to reproduce or refine the causal loop diagram produced in this study with community stakeholders in a low-resource

setting is likely to reveal important pathways, feedback loops, determinants, and outcomes that were not identified in this study. One previous study that utilized a participatory group model-building approach to examine low demand for mental health services in Afghanistan revealed several similarities to the causal loop diagram produced in this study including the following: (1) stigma as a barrier to help seeking, (2) social problems and discrimination exacerbating mental health problems, (3) increased mental health system capacity improving the receipt of mental health services, and (4) awareness of mental health problems reducing stigma toward people living with mental disorders.<sup>92</sup> In order to evaluate the generalizability of these results, future research should also examine whether relationships among determinants are modified by population, mental health condition, and context.

Despite these limitations, this study extends our characterization of the common determinants of mental health services in low- and middle-income countries from a descriptive to a relational perspective. These findings reinforce the importance of community stakeholder engagement, strengthening health systems and human resources for mental health, addressing social determinants of mental health, and building political commitment—all interacting to promote sustainable mental health services that will produce a population-level impact. Fully elaborating these relationships will require further integration of systems science into ongoing implementation research to refine and confirm the relationships described in this study, which were derived from published literature. Applying systems-science methodologies to implementation science enables us to discover promising leverage points to improve the sustainability and population-level impact of mental health services, implementation strategies, and policies.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Acknowledgments

**Supported**, in part, by Centers for Disease Control and Prevention grant no. U48DP006396 (Dr. Huang) and National Institute of Mental Health grant no. T32MH096724 (Drs. Giusto and Stockton).

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**Text Box 1**

**Description of Causal Loops**

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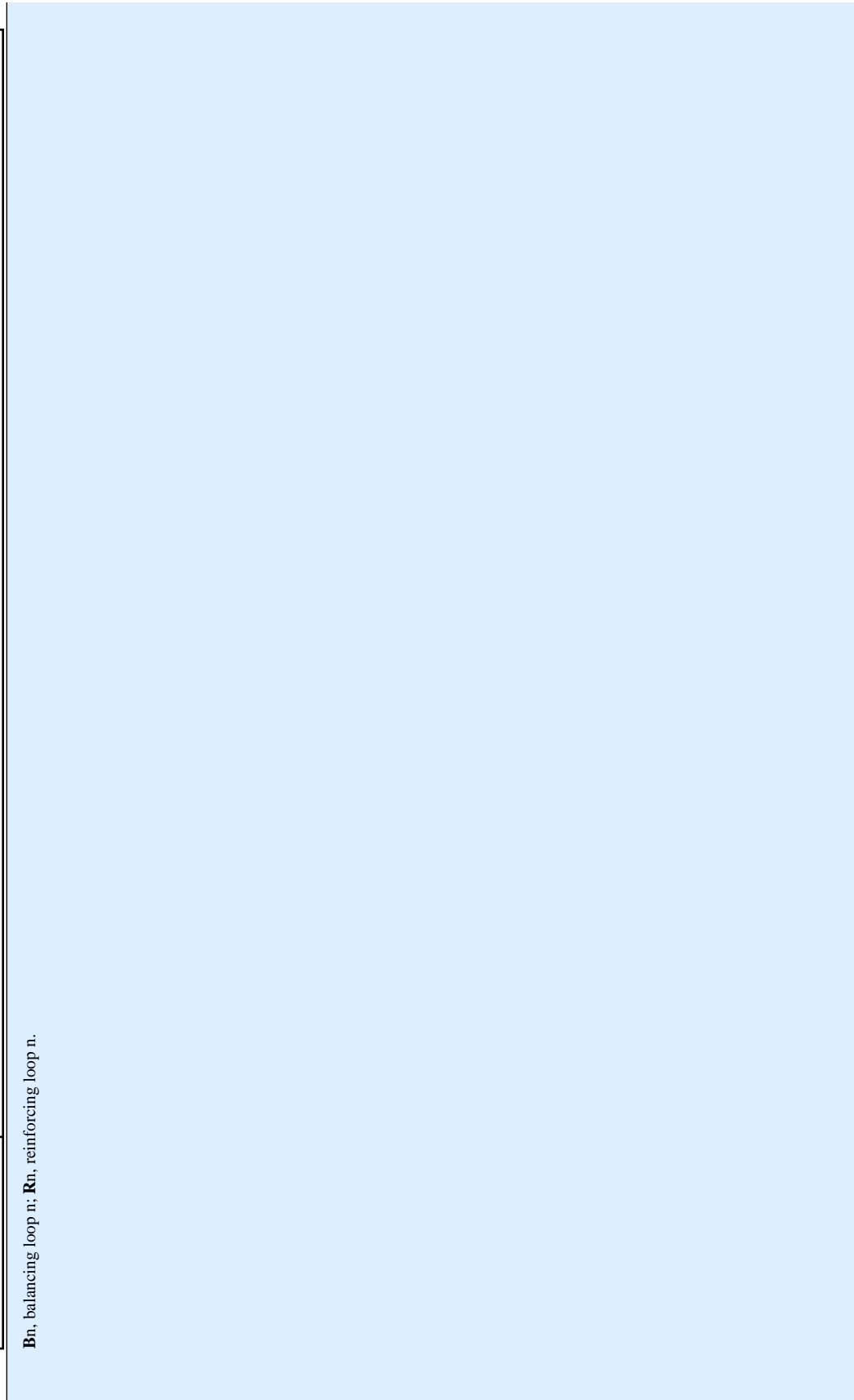
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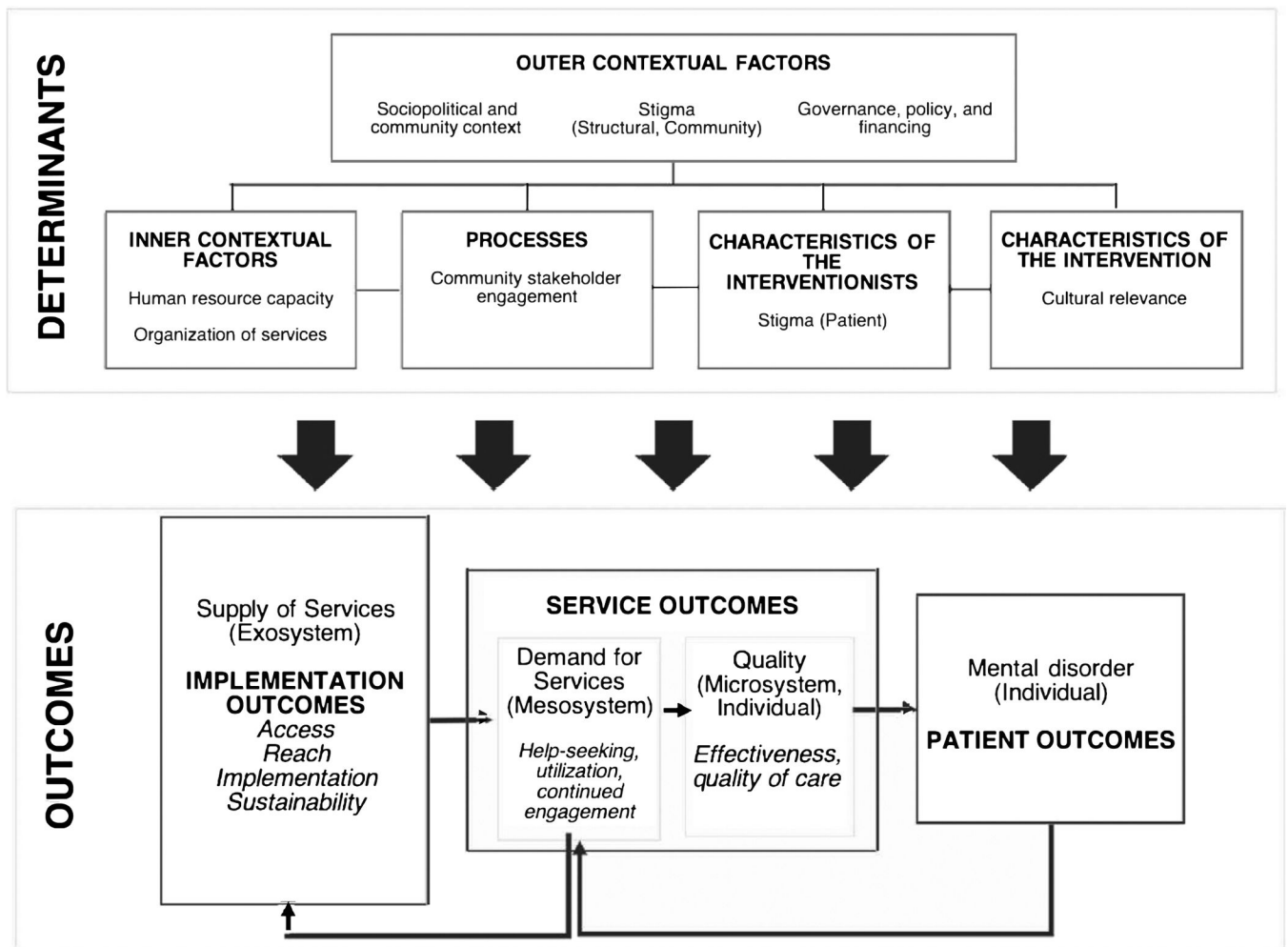
Name	Descriptions and Assumptions
<b>R1.</b> Cultural acceptability	The relevance and acceptability of mental health services was driven by the system's understanding of local mental health and psychosocial needs. The relevance and acceptability of mental health services increased community stakeholder engagement, which further reinforced an understanding of the mental health and psychosocial needs of the community.
<b>R2.</b> Community ownership	Community stakeholder engagement in the process of implementing mental health services promoted coordination across multiple relevant stakeholders (e.g., medical providers, traditional healers), which increased community trust and buy-in. Community trust and buy-in was a critical determinant of the relevance and acceptability of mental health services, which further reinforced community stakeholder engagement.
<b>R3.</b> Coordination & organization of mental health services	Community buy-in and trust was an antecedent and a consequence of stakeholder collaboration and coordination in the delivery and organization of mental health services. Stakeholders ranged from medical providers (primary care, specialists, community health workers), traditional and religious healers, health system managers, and policymakers. Coordination among these stakeholders strengthened opportunities for integrated services, which ultimately increased access to services for communities in low-resource settings. Access increased the reach of mental health services, which increased community stakeholder engagement, medical pluralism, and community buy-in and trust.
<b>R4.</b> Provider strain	As treatment demand and help seeking increased, so did provider workload. Increased provider workload led to provider burnout and staff turnover, ultimately leading to a shortage of providers and reduced supply of mental health services.
<b>R5.</b> Stigma	Increased training of providers in mental health reduces provider stigma. Provider stigma was described as a driver of social stigma against people with mental health problems. Increased social stigma reduced help seeking and increased discrimination and inequality, which increased the prevalence of mental disorders.
<b>R6.</b> Social adversity	Setting insecurity (e.g., conflict, violence, adversity) was associated with an increase in the severity of social problems among community members, which further drove discrimination and inequality. Inequality in these communities further destabilized the setting, leading to a weak health system and poor infrastructure as well as the increased prevalence of mental disorders.
<b>R7.</b> System level knowledge and feedback	The presence of a mental health information, monitoring, and evaluation systems was driven by the presence of a mental health policy, plan, and related funding to support the public mental health system. Mental health information systems increased mental health awareness, which reinforced the development of policies to address the mental health needs of the population. Mental health information, monitoring, and evaluation systems increased the quality of mental health services by providing feedback to the mental health system and strengthening accountability for delivering quality care. Mental health awareness and system-level feedback reduced social stigma by reinforcing messages of recovery and presenting accurate information about the mental health needs of the population.
<b>B1.</b> Supply & demand	Supply of mental health care (access, availability, and implementation of mental health services) and demand for mental health services (help seeking, utilization, and continued engagement and retention in care) were related through a balancing relationship whereby, in the long-term, increased demand for services (i.e., help seeking) drove increased supply (i.e., access), and increased supply of services reduced demand. These constructs were also indirectly related through increasing community stakeholder engagement and tailoring of services to local needs in order to accurately identify and link people with mental health problems to appropriate services (B3); demand increasing provider strain, increasing turnover, and reducing human resources, which was mitigated by efforts to build capacity of the mental health workforce (R4, B6), and stigma, which was influenced by provider and community awareness about mental health problems and services, ultimately reducing demand for services (R5).
<b>B2.</b> Receipt of effective mental health services	Community demand for mental health services and perceiving those services as effective was associated with greater quality of services in a given context. The greater quality of services, which included their effectiveness and quality of care, was associated with a reduction in the prevalence of mental disorders, thereby alleviating the demand for mental health services.
<b>B3.</b> Tailoring mental health services to community needs	Increased demand for services increased community stakeholder engagement. Increased community stakeholder engagement in the mental health system and development/implementation of mental health services increased the system's understanding of local needs, which improved accurate diagnosis and detection of local presentations of mental health problems and culture-bound syndromes. Improving detection of mental health problems in the community increased access to mental health services.
<b>B4.</b> Holistic care	Community stakeholder engagement often led to medically pluralistic models of care (i.e., the integrated and coordinated services provided by medical providers, traditional healers, religious and community leaders, among others). Medically pluralistic models of care coordination were described as increasing the effectiveness and quality of mental health services, thus reducing the prevalence of disorders which alleviated the demand for mental health services.
<b>B5.</b> Systems, policy, & governance	Community stakeholder engagement in the process of implementing mental health services increased political prioritization through community advocacy, mobilization, and understanding local needs. Greater political prioritization and commitment to mental health services increased the likelihood of having mental

Name	Descriptions and Assumptions
	health policies and plans in place, which often led to the availability of funds to support mental health services and strengthening the mental health system, infrastructure, and capacity building. Downstream impacts of strengthening the mental health system through policy and governance were reducing stigma, strengthening capacity of local providers, and ultimately increasing supply, demand, and quality of services.
<b>B6.</b> Provider motivation	In many low-resource settings, the response to a shortage of providers has been to increase training of specialists or nonspecialists by governments, nongovernmental, or multilateral organizations to provide different forms of mental health and psychosocial support. Training increased provider competency and, subsequently, self-efficacy. Self-efficacy reduced the probability of provider turnover, thus increasing the number of providers present in a system.

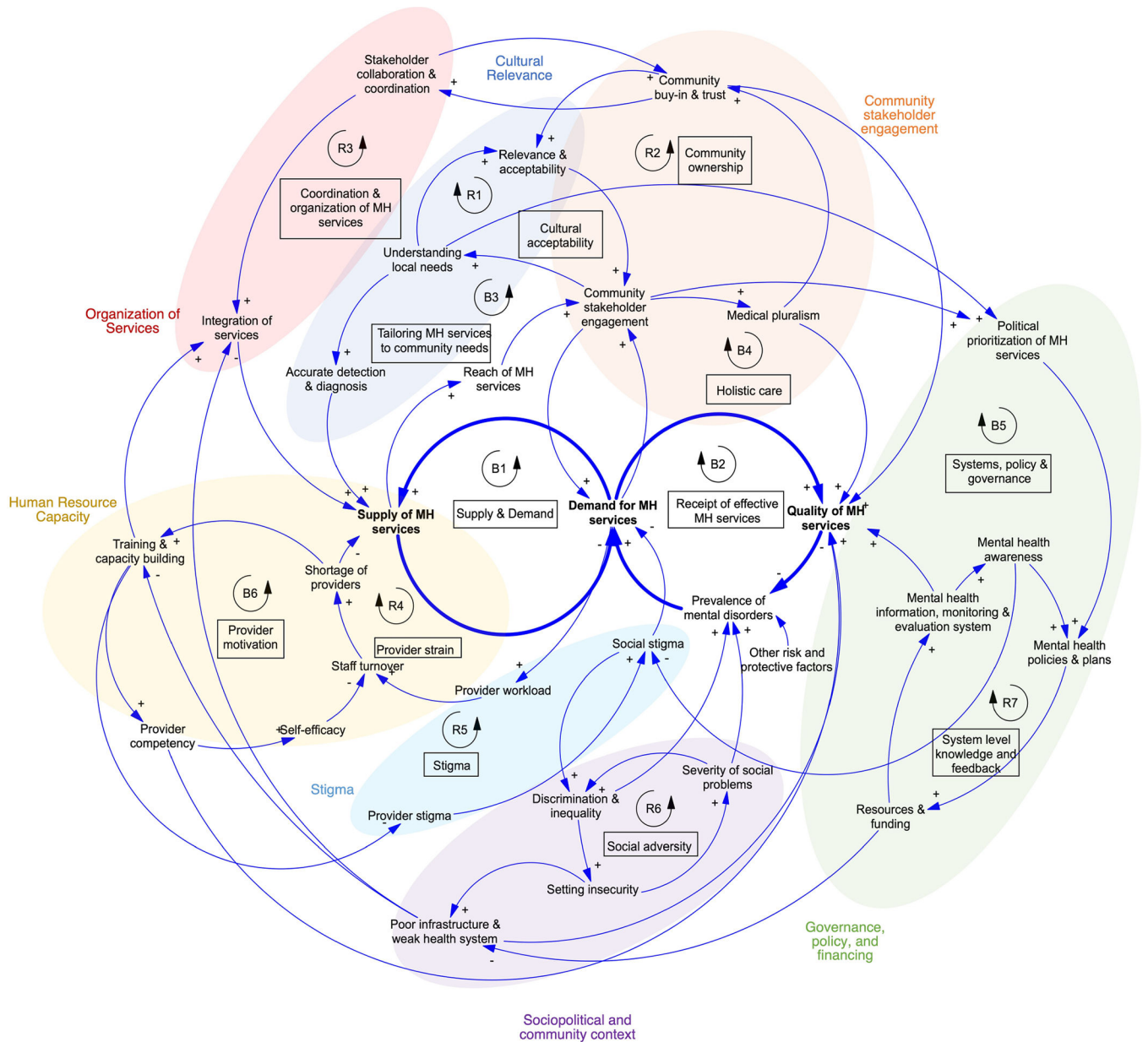
**Bn**, balancing loop n; **Rn**, reinforcing loop n.







**Figure 1.** Common barriers and facilitators of implementing and sustaining mental health services in low- and middle-income countries across social-ecological levels. Adapted from Proctor et al. (2011)<sup>74</sup> and Shelton et al. (2018).<sup>75</sup>



**Figure 2.** Factors contributing to the implementation and sustainability of mental health services and the prevalence of mental disorders in low- and middle-income countries. Reinforcing loop (R): amplifying processes whereby changes in the determinants and outcomes described in the loop result in an exponential growth or decline unless regulated by external forces. Balancing loop (B): self-regulating processes that limit growth or maintain equilibrium of a process leading to a plateau or steady state over time. Positive association (+): higher levels of determinant lead to higher levels of outcome; lower levels of determinant lead to lower levels of outcome. Negative association (-): higher levels of determinant lead to lower levels of outcome; lower levels of determinant lead to higher levels of outcome. A

larger, full-color version of this figure is available online as Supplemental Figure 4, <http://links.lww.com/HRP/A178>.

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**Table 1**  
Barriers and Facilitators to the Sustainability of Mental Health Services Across Domains of the Integrated Sustainability Framework (ISF)

	Barrier	Facilitator
<b>Outer contextual factors:</b>	<b>Sociopolitical context, funding environment, external leadership, values/needs/priorities, community ownership, policy/legislation</b>	
<b>Demand for MH services</b>	<p><b>Cultural relevance</b> Cultural norms, gender norms, beliefs and values related to MH inconsistent with services</p> <p><b>Sociopolitical and community context</b> Geographic constraints and poor transportation Migration and population mobility Salience of social problems in the community</p> <p><b>Stigma</b> Community (social) stigma Community misconceptions about MH Community support for mental health problems</p>	<p><b>Community stakeholder engagement</b> Community trust in MH services and health system Community MH awareness/community members recognize symptoms of MH problems</p> <p><b>Cultural relevance</b> Community perceives MH services to be effective</p> <p><b>Sociopolitical and community context</b> Subsidized services/insurance Technical capacity (community infrastructure [e.g., internet, phone])</p> <p><b>Stigma</b> Positive community attitudes toward people with MH problems Normalization and encouragement for mental health help seeking</p>
<b>Supply of MH services</b>	<p><b>Governance, policy, and financing</b> Inefficient allocation of resources not based on need/demand Restrictive regulations Privatization of MH services Constraints imposed by international donors</p> <p><b>Sociopolitical and community context</b> Setting insecurity, conflict Government turnover Inequity, health disparities, discrimination</p> <p><b>Stigma</b> Structural stigma</p>	<p><b>Community stakeholder engagement</b> Community MH advocacy</p> <p><b>Governance, policy, and financing</b> Governance and accountability MH awareness at government and health system leadership levels MH policies and plans Government commitment and prioritization of MH MH included in government budget Representation of MH experts in government Political prioritization Sustainable funding</p>
<b>Quality of MH services</b>		<p><b>Community stakeholder engagement</b> Community trust in MH services and health system</p>
<b>Inner contextual factors:</b>	<b>Program champions, leadership/support, organizational resources/funding, staffing/turnover, climate/culture, structural characteristics, capacity, policy alignment, mission</b>	
<b>Demand for MH Services</b>		<p><b>Community stakeholder engagement</b> Shared experiences among service users <b>Organization of services</b> Community-based care</p>
<b>Supply of MH Services</b>	<p><b>Governance, policy, and financing</b> Limited resources (financial, human, supplies) Medication stock-outs Cost of delivering services</p> <p><b>Human resource capacity</b> Shortage of mental health providers Unequal distribution of MH human resources across health system institutions Competing priorities in the delivery of health care limiting the time and capacity to treat MH problems High caseload/workload Provider turnover Professional culture not supportive of evidence-based practices</p>	<p><b>Human resource capacity</b> Staff capacity/ability to train staff Adequate compensation of providers for MH services (parity with other specialties)</p> <p><b>Organization of services</b> Supportive and collaborative provider teams Co-located MH specialist Administrative support (e.g., with scheduling) Prioritization of MH services within health system Representation of MH experts in health system Established referrals and referral system Well organized services Integrated, decentralized services Multidisciplinary teams</p>

			<b>Facilitator</b>
			<b>Sociopolitical and community context</b> Technical support and capacity (service infrastructure; e.g., internet, phone)
			<b>Governance, policy, and financing</b> Champions and leaders accountable for monitoring and ensuring quality of care Availability of prevention and promotion services
<b>Quality of MH Services</b>			
<b>Processes: Partnership/engagement, training/supervision, program evaluation/data, adaptation, fidelity, planning, team/board functioning</b>			
<b>Demand for MH Services</b>			<b>Community stakeholder engagement</b> Supportive community services Community engagement Community buy-in and support Engagement of traditional healers and other service users Collaboration between traditional healers and medical providers Government partnerships
<b>Supply of MH Services</b>		<b>Organization of services</b> Poor management of mental health providers	<b>Community stakeholder engagement</b> Engagement of traditional healers and service users Collaboration between traditional healers and medical providers Community engagement Government partnerships <b>Human resource capacity</b> Training and career development opportunities that are high-quality and locally tailored Official recognition and accreditation of providers <b>Organization of services</b> Coordination and effective communication within organizations
<b>Quality of MH Services</b>			<b>Community stakeholder engagement</b> Collaboration between traditional healers and medical providers Community engagement (including service users, traditional healers) <b>Governance, policy, and financing</b> Mental health information systems Mechanisms to monitor fidelity, competency, and quality Privacy and data security <b>Human resource capacity</b> Dissemination of effective practices and feedback Standardized training and clinical guidelines Ongoing supportive supervision
<b>Characteristics of the interventionists and population: Implementer/provider characteristics, implementer skills/expertise, attitudes, motivations, population characteristics</b>			
<b>Demand for MH Services</b>		<b>Community stakeholder engagement</b> Previous negative experience in health care (e.g., discrimination, lack of trust) Patient concerns about confidentiality, privacy & treatment (e.g., trust, competence, effects of medication) <b>Cultural relevance</b> Somatization and alternative presentations of MH problems Language barriers between provider and patient	<b>Community stakeholder engagement</b> Patients/community perceive providers as trustworthy, credible, and acceptable Previous positive experiences in seeking MH services (patient) Adherence/retention in intervention <b>Cultural relevance</b> Patient intervention preferences (e.g., pharmacological vs. psychotherapy vs. traditional) Perceived efficacy of services (patient)

	<b>Barrier</b>	<b>Facilitator</b>
	<b>Stigma</b> Patient (self) stigma	<b>Human resource capacity</b> Therapeutic alliance, rapport, and matching (e.g., therapists with desired characteristics)
<b>Supply of MH Services</b>	<b>Cultural relevance</b> Complex cases (e.g., comorbidities, high severity) Population heterogeneity Somatization and alternative presentations of MH problem <b>Human resource capacity</b> Provider burnout Dependence on specific cadre of providers	<b>Human resource capacity</b> Provider satisfaction, motivation, self-efficacy, and confidence Provider interest in MH services
<b>Quality of MH Services</b>	<b>Human resource capacity</b> Provider burnout	<b>Community stakeholder engagement</b> Patient trust in providers Cultural relevance Providers understand patient/population needs <b>Human resource capacity</b> Provider competency Willingness of providers to accept feedback
<b>Characteristics of the intervention: Perceived benefit/need, adaptability, fit with context and population, burden/complexity, trialability, cost</b>		
<b>Demand for MH Services</b>	<b>Cultural relevance</b> Language incongruency between treatment origin and implementation Length of intervention <b>Governance, policy, and financing</b> Cost of obtaining intervention or medications	<b>Cultural relevance</b> Appropriate adaptation and translation of interventions (e.g., inclusion of cultural symbols, metaphors, language, visual aids) and measurement tools Cultural sensitivity and relevance of intervention Acceptability of intervention Ease of use (intervention) Inclusive, user-centered interventions Flexibility of intervention (location, duration, etc.) <b>Governance, policy, and financing</b> Subsidized intervention
<b>Supply of MH Services</b>	<b>Governance, policy, and financing</b> Cost of delivering services <b>Human resource capacity</b> Cost of recruiting new providers Intervention requires intensive, ongoing supervision	<b>Governance, policy, and financing</b> Subsidized intervention
<b>Quality of MH Services</b>	<b>Cultural relevance</b> Language and cultural barriers Misdiagnosis	<b>Cultural relevance</b> Perceived efficacy of intervention Holistic MH interventions <b>Governance, policy, and financing</b> Intervention has been piloted with evidence of feasibility

MH, mental health.