



**A MODEL FOR SCALE UP OF FAMILY HEALTH INNOVATIONS
IN LOW- AND MIDDLE-INCOME SETTINGS: A MIXED
METHODS STUDY**

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A MODEL FOR SCALE UP OF FAMILY HEALTH INNOVATIONS IN LOW- AND MIDDLE-INCOME SETTINGS: A MIXED METHODS STUDY

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AIDED model for scale up of family health innovations

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Key words: *scale up, family health, low-income settings, innovation, global health*

Abstract

Many family health innovations that have been shown to be both efficacious and cost-effective fail to scale up for widespread use particularly in low- and middle-income countries (LMIC).

Although individual cases of successful scale up have been described, we lack an integrated and practical model of scale up that may be applicable to a wide range of public health innovations in LMIC. We conducted a mixed methods study that included in-depth interviews with 33 key informants and a systematic review of peer-reviewed and gray literature. We focused on efforts to spread family health innovations broadly defined including the use of Depo-Provera, exclusive breastfeeding, community health workers, and family health oriented social marketing programs. We used the constant comparative method of qualitative data analysis to extract recurrent themes from the interviews, and we integrated these themes with findings from the literature review to generate the proposed model of scale up.

Objective

To develop an integrated and practical model of scale up that synthesizes experiences of family health programs in low and middle income countries (LMICs).

Design

Mixed methods study including in-depth interviews and a systematic review of peer-reviewed and gray literature.

Results

The resulting model – the AIDED model – included 5 non-linear, interrelated components: 1) assess the landscape, 2) innovate to fit user receptivity, 3) develop support, 4) engage user groups, and 5) devolve efforts for spreading innovation. Our findings suggest that successful

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12 multiple feedback loops, and several potential paths to achieve intended outcomes. Failure to
13
14 scale up may be attributable to insufficient assessment of user groups in context, lack of fit of the
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16 innovation with user receptivity, inability to address resistance from stakeholders, and
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18 inadequate engagement with user groups.
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20 21 **Conclusion**

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23 Flexible strategies of assessment, innovation, development, engagement, and devolution are
24
25 required to enable effective change in the use of family health innovations in LMIC.
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30 **Summary**

31 Article focus

- 32
33 1. To develop an integrated and practical model of scale up that synthesizes experiences of
34 family health programs in low and middle income countries (LMICs).
35
36 2. The resulting model – the AIDED model – included 5 non-linear, interrelated components: 1)
37 assess the landscape, 2) innovate to fit user receptivity, 3) develop support, 4) engage user
38 groups, and 5) devolve efforts for spreading innovation.
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40 Key messages

- 41
42 1. Failure to scale up may be attributable to insufficient assessment of user groups in context,
43 lack of fit of the innovation with user receptivity, inability to address resistance from
44 stakeholders, and inadequate engagement with user groups.
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46 2. Successful scale up occurs within a complex adaptive system, characterized by interdependent
47 parts, multiple feedback loops, and several potential paths to achieve intended outcomes
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49 3. Flexible strategies of assessment, innovation, development, engagement, and devolution are
50 required to enable effective change in the use of family health innovations in LMIC.

51 Limitations of this study

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53 1. The inductive approach used to construct the AIDED model did not allow for simultaneous
54 empirical testing of the model. Future research is needed to validate the AIDED model in new
55 contexts other than those described by our key informants.
56
57 2. Additionally, the literature may have publication bias in which negative studies are
58 underrepresented, and interviews may have social desirability bias, in which participants may
59 have misrepresented their experiences in order to provide desirable answers. Nevertheless, we
60 did find cases of unsuccessful scale up in the literature, and we probed intentionally to elicit both
positive and negative experiences from key informants in order to minimize bias.
3. The AIDED model did not address long term sustained use of innovations that are successfully
scaled up. This will require further research to identify lessons learned based on contrasting
levels of success sustaining the scaled up innovations in different settings.

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12 http://www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author)
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14 and declare: no support from any organisation for the submitted work; no financial relationships
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16 with any organisations that might have an interest in the submitted work in the previous three
17
18 years, no other relationships or activities that could appear to have influenced the submitted
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35 There are no additional unpublished data available to share.
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40 Authorship: EHB conceptualized and designed the study, conducted and monitored data
41
42 collection for the literature review and interview components, analyzed the data and drafted and
43
44 revised the paper. She is the guarantor. LAC conceptualized and designed the study, conducted
45
46 and monitored data collection for the interview component, analyzed the data and drafted and
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48 revised the paper. LT managed all aspects of the study, conducted data collection, participated in
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50 data analysis and drafting and revising the paper. SWP participated in data analysis for the
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52 literature review and interviews and drafted and revised the paper. KTS participated in data
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54 analysis. CY participated in the literature search and related analyses. AF conducted data
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56 collection and participated in data analysis. DM coordinated the literature search and interview
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58 components, participated in data analysis for the literature review and interviews. DKC
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60 contributed to project management, writing and revising the paper. DB contributed to data

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analysis for the interview component. RPE participated in data analysis for the literature review and writing and revising the paper.

For peer review only

Introduction

Many family health innovations that have been shown to be both efficacious and cost-effective fail to scale up for widespread use particularly in low- and middle-income countries (LMIC). As of 2008, only 45% of married women in LMIC were using modern contraception and only 5% were using injectables, (1) rates of exclusive breastfeeding for the first 6 months of life are reportedly at about 38% in LMIC(2), and much of Africa lacks potentially beneficial community health worker programs (3). Such limited use of these family health efforts persists despite ample evidence of their health benefits and cost-effectiveness.

Although individual case studies of successful scale up have been documented, we lack an integrated, practical model that synthesizes scale up experiences of family health programs in LMIC. Existing frameworks have identified factors that may influence scale up (4-7), including features of the innovation, the potential adopters, and the environment in which scale up occurs. Nevertheless, these broad domains provide limited guidance on the mechanisms of scale up, which are essential for guiding effective scale up efforts in family health.

Accordingly, we sought to synthesize the evidence from key informant experiences as well as peer-reviewed and grey literature to produce a practical model of scale up. For the purposes of our analysis, we refer to innovation as the use of products, practices, or approaches that, for the user, are new. We used Depo-Provera as an example of a product innovation, exclusive breastfeeding as an example of a health behaviour innovation, community health workers (CHWs) as an example of an organizational innovation, and social marketing as an example of business model innovation. These sample innovations provided lenses through which to examine scale up processes in family health in LMIC.

Methods

Study design and sample

We conducted a mixed methods study that included in-depth interviews and a systematic review of peer-reviewed and grey literature. We chose to include a qualitative approach because this method is well suited for studying complex and nuanced social processes (8, 9) and for generating novel insights (8, 10, 11) through the use of inductive approaches.

In-depth interviews

We conducted in-depth interviews with 33 key informants who had a broad range of experiences with scale up of the selected family health innovations in LMIC including senior public health professionals from development agencies, governmental health departments, non-governmental organizations, and foundations. We developed a purposeful sample of key informants using relevant peer-reviewed or grey literature and snowball sampling (8). We enrolled respondents until we achieved theoretical saturation (8, 11), i.e., until successive interviews produced no new concepts, which occurred with 30 interviews. Interviews were conducted by research team members experienced in qualitative interviewing; two researchers with diverse backgrounds conducted each interview using a standard interview guide (**Figure 1**) either in person or via telephone. The study was reviewed by the Yale Human Subjects Committee (IRB # 00000594) and granted an exemption under 45 CFR 46.101(b)(2).

We used the constant comparison method (8, 11) to classify key concepts, expanding and refining properties of the codes with review of successive transcripts. We reconciled differences in coding through consensus and finalized a comprehensive code structure, which was

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12 systematically applied to all transcripts. We used ATLAS.ti Scientific Software, version 6.1, to
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14 facilitate organization, analysis, and retrieval of data.

15 16 17 *Literature review*

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19 We conducted a systematic review of peer-reviewed and grey literature for each of the
20
21 selected innovations. We searched for peer-reviewed literature in 11 electronic databases, and for
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23 grey literature, through the websites of 20 global health agencies. Screening and data extraction
24
25 were conducted independently by 2 researchers using standardized exclusion criteria and a
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27 common data extraction form.
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31 In the qualitative study, we employed several methods recommended by experts to
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33 improve the trustworthiness and reliability of the findings (8). These included tape-recording
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35 interviews after consent, using a team of five data coders and analysts who reflected different
36
37 disciplines, and retaining an audit trail of methods and coding decisions throughout the analysis.
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39 For a subset of key informants, we used participant confirmation (8, 12) and incorporated their
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41 additional insights from review of the initial findings. Additionally, after the interview and
42
43 literature review data were synthesized, we conducted respondent validation. (13) In this
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45 process, findings from the in-depth interviews and literature synthesis were shared with study
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47 participants to provide feedback; these reactions were addressed and accounted for in the
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49 analysis.
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54 **Results**

55 56 57 *Description of samples*

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59 We interviewed a total of 33 key informants (**Table 1**). Our search of peer-reviewed
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61 literature returned 1,446 unique articles, of which 41 were retained for data extraction based on
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63 our review criteria; 4 additional papers not identified through the electronic search were obtained

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12 from the authors' files (**Figure 2**). Additionally, our search of the grey literature returned 30
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14 unique sources for data extraction.

15 16 *The AIDED model*

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18 Analysis of in-depth interview data and the synthesis of the peer-reviewed and grey
19
20 literature revealed 5 interrelated components of the scale up process: assess, innovate, develop,
21
22 engage, and devolve, which together comprise the AIDED model (**Figure 3**). The data
23
24 highlighted the complexity and non-linearity of the process, which included multiple feedback
25
26 loops. Key informants nonetheless indicated that donors and implementers rarely appreciated this
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28 complexity:
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33 There's a lot of magical thinking about what this "pilot project" or "proof of concept"
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35 will do because it's not very real in terms of the stakes necessary to actually sustain for
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37 impact and scale. (Interview #3)

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39 **Assess the landscape.** The first component involved obtaining a precise understanding of
40
41 the receptivity of the user groups and of the environmental context of the user groups. Key
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43 informants suggested that a primary limitation of scale up efforts was poor understanding of
44
45 what communities want, and multiple studies (14, 15) highlighted the importance of conducting
46
47 an in-depth assessment prior to launching dissemination efforts.
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51 In public health, there is often a lot of confusion between the need and the demand for
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53 innovations. There is a tendency to approach the idea with, "okay, if I look at the
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55 incidence of this particular disease and I know that this particular intervention can solve
56
57 that disease...then, why isn't this diffusing more?" You have to work from what
58
59 consumers want. (Interview #23)

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61 In addition, the assessment component included examining environmental conditions that
62
63 may promote or impede take up of the innovation. Key informants explained that such conditions
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65 include the political, regulatory, economic, social, cultural, and technological environments.
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12 Relevant assessments may span multiple levels from the local to the global, as expressed by one
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14 key informant with regard to breastfeeding programs:
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17 Assessments occur at various levels. You have the assessment in the community to find
18 out the beliefs and practices in the community. You have opinion leader research...to
19 find out where you stand in terms of policies and their attitudes towards breastfeeding,
20 and then stakeholder analysis. So we have all those types of assessments at the very
21 beginning. (Interview #12)
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23
24 **Innovate to fit with user receptivity.** This component included adapting the innovation
25
26 to local context and preferences, so that receptive users would perceive the innovation as
27
28 providing relative benefits in their specific context or environment. Adaptation involved both the
29
30 design and packaging of the innovation and was highlighted by key informants and in the
31
32 literature (14). Involvement of stakeholders from user groups at this early stage facilitated
33
34 matching between the innovation and user group receptivity. One key informant highlighted the
35
36 importance of precise fit to a particular context in the case of Depo-Provera:
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40 To activate this [the injection], it is very simple. A super simple device, it was not a hand-
41 me-down. This was reengineered for the developing country. There was no developed
42 country use for this technology at all. (Interview #1)
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46 Non-technical features of the innovation design and packaging were also noted as
47
48 important. In the case of CHWs as an innovation, experts spoke about CHW task assignments,
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50 role definitions, and community perceptions as examples of design and packaging. Key
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52 informants highlighted how the visible benefits of using CHWs generated a perceived advantage
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54 for the innovation, which was critical to its fit with the community needs and wants, and
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56 subsequent take up:
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60 The community has to see CHWs as valuable. If they are doing something the
community really values, it will work....In Nepal, CHWs were valued by the community
mostly because [of] the Vitamin A program where the community health worker would
give Vitamin A to kids. And that lowered mortality fast, and the communities really
valued that. It raised the community health and respect, especially because the health

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12 can save the kid by getting them to the right place and having medicines, then [the]
13 community values that. It is very visible. (Interview #11)
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16 **Develop support.** This component referred to priming the environment to be supportive
17 of increased use of the innovation. Developing support involved enhancing education and
18 addressing resistance to the innovation. Key informants described resistance from groups that
19 might suffer economic or political losses if the innovation became routine practice:
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25 What you hear at the ministries of health is from people whose livelihood may be
26 affected or whose turf or influence they think is being diminished. So, you know, nurses
27 in Kenya right now...we are getting from the nursing association that we have
28 unemployed nurses in Kenya. Why should we have community workers giving Depo
29 injections ...the midwives and doctors will give similar answers and... it turns out to be a
30 turf battle. (Interview #14)
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33 Involving these groups in assess and innovate components was also viewed as helpful to
34 addressing resistance and building support. In adequate development of support and emerging
35 resistance from stakeholders were common reasons cited for failure of scale up efforts in the
36 literature (16-19). Key informants emphasized the importance of strategic networking and
37 collaboration in the development of political and economic support and support at the regional,
38 national, and global levels.
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47 If you understood the political science and the political economy you'd see actually what
48 I need to do is I need to target policy makers first. (Interview #5)
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51 One [effort is] focused at the policy level and working with decision makers...getting
52 them the information that they need to then further promote or, if they are not already
53 convinced, to help them be convinced. (Interview #14)
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56 Legal and regulatory action that supported the innovation also played a critical role according to
57 key informants. For instance, in the case of exclusive breastfeeding, both key informants and the
58 literature (17, 19, 20) noted the importance of legislation in providing paid maternity leave and
59 curbing the marketing of substitutes for breast milk in several countries including Brazil:
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Another important aspect that came...were the policies that were...elected by the government...[it was] decided to provide four months of paid maternity leave to formal working women....so '88 came this decision, this law, and also in 1988...an approval of the National Code of Marketing of Breast-Milk Substitute...also important for the continuation of the pro-breastfeeding campaign. (Interview #22)

Understanding and addressing resistance was often accomplished by using data, in some cases from controlled trials funded in the country and in other cases through more non-traditional forms of data. For instance, the highly successful scale up of CHWs in Pakistan involved building political support through evidence-based advocacy:

We spent a year collecting and generating local data from the district on perinatal mortality, its distribution, and causes of death. This more than anything was critical in focusing the attention of the local politicians and policy makers. [We] made several presentations to the Minister of Health and the Director General ...to persuade them of the importance of doing something and getting the buy-in from the program people. (Interview #27)

Key informants underscored the role of economic incentives in developing support for the innovation and to propel scale up. In the case of Depo-Provera, for instance, key informants discussed the importance of developing sufficient incentives to produce, sell, and buy the product:

It's really not rocket science. You get a product; you put it in a box....If it's cheap enough, people will buy it. If it's too cheap, retailers won't stock it. Play with those two variables. The margins have to be attractive to those within the retail chain, but the end price has to be affordable to the consumer. (Interview #7)

You promise [the manufacturer] more volume, asking them for lower margins. And the premise was that that drug now would go to the supply chain and end up at the frontline at between 30 and 50 cents, more or less. (Interview #3)

Economic disincentives were noted as major sources of resistance, particularly in the areas of exclusive breastfeeding and use of CHWs, which were viewed by infant formula companies and

clinicians, respectively, as crowding out their businesses. As a key informant said:

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12 to increase the prevalence of choosing breastfeeding....It's a competition between
13 different priorities that women go through. It's not that they don't want to. They have to
14 do something else, to go to work. So the financial incentives would be important I think
15 and that has not been done. (Interview #8)
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18 **Engage with user groups.** Engagement with user groups was viewed by key informants
19
20 as occurring throughout the scale up process and involved several necessary steps: 1)
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22 introduction of the innovation from outside the user group to inside the user group via boundary
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24 spanners, 2) translation of the innovation so that user groups could assimilate the new
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26 information, and 3) integration of the innovation into the routine practices and social norms of
27
28 the user group.
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32 Introduction of the innovation referred to giving information about the innovation to the
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34 user group. Critical to the process, however, was that this introduction be accomplished by
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36 someone who had an essential, pre-existing role in the user group and who also has contact with
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38 people outside the potential user group, i.e., someone who was a boundary-spanner. Translation
39
40 was the process that allowed new information about the innovation to be assimilated by the
41
42 potential user groups. Translation included the development of practical guides, blueprints, and
43
44 protocols that were comprehensible and relevant for the user group. In reflecting on the success
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46 factors in implementing the community health worker model in Nepal, one key informant
47
48 described how people in the community collaborated in translation:
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53 One of the reasons the manual was particularly good [was] ...we contracted with the
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55 literacy group and with UNICEF because they had the only good artists... And the three
56
57 groups [the literacy group, UNICEF, and the Ministry] had to work together to produce
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59 the sort of communications...that worked with the CHWs. (Interview #11)
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62 Translation also included more subtle ways to contextualize or frame the innovation in a way
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64 that made it appealing to larger numbers of people in the user group, such as describing the
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12 innovation using local idioms, stories, or historical examples, or associating the innovation with
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14 important values or practices within the group.
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17 We realized that the best [health] counsellors were our cleaning ladies because they knew
18 how to talk with the ladies. They knew the vocabulary, you know...They were from the
19 same neighbourhoods...They were more or less the age of the ladies...They were also
20 mothers having the same problems. They talked to them very easily, not [acting as if] I
21 am the boss here...I think it feels as if they were having a conversation. (Interview #21)
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24 In some examples, translation occurred via opinion leaders, such as in a reproductive health
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26 project in Afghanistan that disseminated information about contraception, including Depo,
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28 through religious leaders. The project avoided national religious policy debates but engaged
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30 religious leaders at the community level in discussions of the compatibility of contraception with
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32 teachings from the Quran. To accomplish this, the contraception was described not as a method
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34 of family planning, which would have been controversial, and instead was described as the best
35
36 way to ensure women could breastfeed for two years, which was the duration prescribed in the
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38 Quran:
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43 So the one-on-one discussions with the 37 mullahs in these 3 project areas... [the
44 project manager] had these discussions and...and then all of them could agree that this
45 was okay and it was consistent with Islam. (Interview # 30)
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47
48 Once religious leaders were convinced about the fit of the innovation with their values, these
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50 leaders then endorsed the use of contraception in the broader community.
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53 So the mullahs as part of their organizing the community [said] here's how we're going
54 to cover the 3,000 people in our community; we've laid out these plans. We'll make sure
55 that these happen, and I will also talk with the men at Friday prayers about
56 contraception. (Interview #30)
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59 The final aspect of the engage component, integration, referred to the embedding of the
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innovation in the routines and social norms of a user group. Integration was enabled by support
through legislation, educational systems, and changes to broader cultural norms beyond the

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12 immediate user group. For instance, a key informant described this kind of integration relative to
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14 breastfeeding in Brazil:

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17 The behaviour change comes with this facilitation [by] the facilities that the woman
18 finds in society. Instead of being sent out of the bus because she's breastfeeding or out
19 of the health centre because she's breastfeeding, on the contrary, she is well received
20 so this behaviour became normal." (Interview #22)
21
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23 In other instances, the innovation became part of what was taught and passed down to future
24 generations, reflecting its integration into the routine practices of the user group and its
25 sustainability over time. For instance, the CHWs in Nepal who grew too old to work passed the
26 position down to their daughters. The position was viewed as an honour as it was believed to
27 contribute to one's *dharma* for community service (21), which was thought to increase their
28 acceptance in what they understood as the "afterlife."
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37 Each of the communities wanted to be a quality midwife and to wear the brand of a Bidan
38 Delima. There was an advertisement campaign, but much more so, it was a peer pressure,
39 a sisterhood...Women stayed as CHWs for their career, and they ended up passing it
40 down to their daughters. Now that is sustainability! (Interview #10)
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43 **Devolve efforts for spreading the innovation.** This component involved user groups
44 releasing and spreading the innovation for its re-introduction in new user groups within their peer
45 networks. Key informants underscored the importance of peer networks in facilitating the
46 process of release and spread to new user groups, suggesting that trust among the network
47 members was essential, as described in these examples:
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55 We're having huge success now in family planning in Africa by putting early adopters to
56 counsel other women...I think we are seeing a real normative change in a whole bunch
57 of communities in which we operate around family planning, IUDs, sterilization,
58 injectables because, you know, you get women talking to other women. (Interview #19)
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Key informants noted that although relinquishing control over the innovations' spread
was ultimately necessary for full scale up, doing so presented risks, particularly when the

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12 have some negative and positive spinoffs” (Interview #11). Positive spinoffs of spread included
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14 the take up of innovation complements. For example, key informants described how increasing
15
16 the use of CHWs also spread messages and services that they promoted, such as antenatal care,
17
18 better hygiene, HIV testing, and other public health efforts. In contrast, negative unintended
19
20 consequences were also identified and some key informants voiced concerns that scale up
21
22 success should be determined based on comprehensive monitoring and evaluation efforts.
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26 We need a balanced view and measurement impact because sometimes things [can have
27
28 negative effects]. Think about the pneumonia vaccine. It is good, but it increases illness
29
30 too maybe. If we can predict that ahead of time, we can plan for it and maybe lessen the
31
32 negative impacts. (Interview #11)

33 Discussion

34 We identified 5 distinct but interrelated components that comprised the AIDED model of
35
36 scale up for selected family health interventions in LMIC: assess the landscape, innovate to fit
37
38 user receptivity, develop support, engage with user groups, and devolve efforts for spreading the
39
40 innovation. Critical to implementing such an approach is the recognition that the progression
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42 through these components may be nonlinear and involve multiple feedback loops, which can
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44 necessitate reversions to previous components.
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48 The model further indicates that successful scale up is not fully under the control of the
49
50 innovator, donor or implementer but rather grows organically out of a deep understanding of and
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52 engagement with user groups and their environmental contexts. Key informants cautioned that
53
54 there was no single, definitive way to achieve effective scale up in every context. Rather, they
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56 noted that “these things are often very contextual, and there isn’t a magic bullet. Just because
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58 something worked well in one country, doesn’t mean it’s going to work elsewhere” (Interview
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#23). Hence, specific actions and strategies within each component remain context-dependent.

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12 The findings suggest that the process of scale up is dependent on a complex adaptive
13 system, which includes several interlocking parts, multiple feedback loops, and many potential
14 pathways to success. The emergent and somewhat unpredictable nature of complex adaptive
15 systems has several implications for policymakers, practitioners, and researchers. First, real-time,
16 valid information flow across the system is essential to effective scale up. Because actors in the
17 system adapt based on what they understand as environmental conditions, misinformation can
18 create suboptimal situations quickly. Therefore, investments in the data infrastructure and the
19 relationships that underpin valid and reliable information flow are paramount. Second, the
20 achievement of widespread innovation use is the result of a multi-factorial process and cannot be
21 attributed simply to specific, planned actions. Because there are multiple paths to the same
22 outcome, system interventions that include coordination of multiple levels of action (e.g., global,
23 national, local) are most likely to produce successful scale up. Cost-effective management
24 information systems are required for providing the level of coordination needed. Last, because
25 the full outcomes are somewhat unpredictable in complex adaptive systems, it is important to
26 anticipate unintended negative consequences that may emerge and to develop contingency plans
27 for these potential occurrences. Furthermore, careful attention to incentives and accountability
28 systems to limit negative consequences is essential to ethical and effective efforts to disseminate
29 and diffuse innovations.

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55 Our findings should be interpreted in light of several limitations. The inductive approach
56 used to construct the AIDED model did not allow for simultaneous empirical testing of the
57 model. Future research is needed to validate the AIDED model in new contexts other than those
58 described by our key informants. Additionally, the literature may have publication bias (22) in
59 which negative studies are underrepresented, and interviews may have social desirability bias
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12 (23), in which participants may have misrepresented their experiences in order to provide
13
14 desirable answers. Nevertheless, we did find cases of unsuccessful scale up in the literature, and
15
16 we probed intentionally to elicit both positive and negative experiences from key informants in
17
18 order to minimize bias. Last, the AIDED model did not address long term sustained use of
19
20 innovations that are successfully scaled up. This will require further research to identify lessons
21
22 learned based on contrasting levels of success sustaining the scaled up innovations in different
23
24 settings.
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28
29 Paradoxically, complex adaptive systems are at once capable of fast and sweeping
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31 changes and homeostatic, as each part of the system responds to disturbances in such a way that
32
33 the system can maintain the status quo. We identified in this paper several leverage points for
34
35 launching substantial changes in large systems. Nevertheless, recognizing the fundamental
36
37 complexity of the scale up process, funders and innovators alike will require flexible strategies of
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39 assessment, innovation, development, engagement, and devolution to enable effective change in
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41 the use of family health innovations in LMIC.
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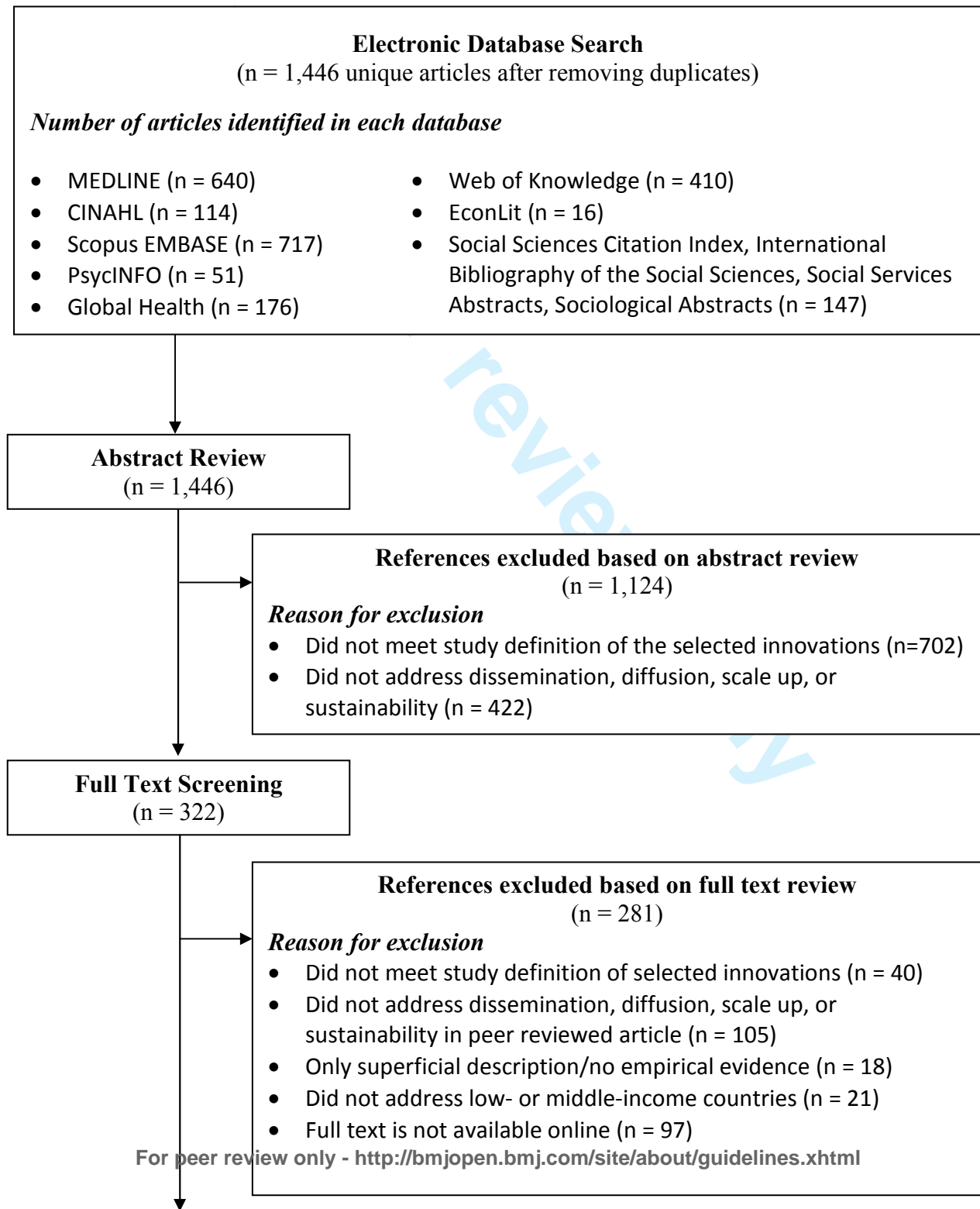
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Figure legends

Figure 1. Discussion guide used in key informant interviews.

1. Let's start by having you describe your role in implementing this intervention. What was your role and how long were you involved?
2. We are interested in your experience with scaling the intervention. What was the process, from implementation to scale-up of the intervention? Walk me through that.
 - What was the goal?
 - How did you first approach addressing the issue and implementing the intervention?
 - What were the key components of the process?
 - Did you come to the process with any pre-conceived ideas about how you would accomplish the task? Can you describe those?
 - How did you/are you measuring success?
3. What kinds of challenges came up and how did you handle those?
4. Looking back, is there anything that might have been done differently?
5. Is there anything else we should have asked to help us understand your experience with the intervention and process of implementation and scale-up better?

Figure 2. Selection of peer-reviewed literature^{1,2}



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12 ¹ During the review, 4 additional papers not identified through the electronic search were
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14 obtained from the authors' files, resulting in a total of 45 peer-reviewed articles for review.
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17 ² Gray literature was obtained from the following Websites: WHO, UNICEF, UNDP, UNFPA, the
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19 World Bank, the African Development Bank, the Inter-American Development Bank, the Asian
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21 Development Bank, USAID, CIDA, DFID, SIDA, GTZ, the Global Fund to Fight AIDS, Tuberculosis
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23 and Malaria, CARE, GAIN, Family Health International, Partners in Health, Management
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25 Sciences for Health, and John Snow, Inc.
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Table 1. Characteristics of key informants

| Characteristic | Number | % |
|---|--------|-------|
| Area of expertise | | |
| Family planning (Depo-Provera) | 7 | 21.2% |
| Social marketing | 6 | 18.2% |
| Policy making | 6 | 18.2% |
| Community health worker approaches | 5 | 15.2% |
| General | 5 | 15.2% |
| Breastfeeding | 4 | 12.1% |
| Affiliation | | |
| Nongovernmental organization | 20 | 60.6% |
| Government | 4 | 12.1% |
| United Nations agency | 3 | 9.1% |
| Consultancy | 3 | 9.1% |
| Academic | 3 | 9.1% |
| Disciplinary background | | |
| Maternal and child health | 7 | 21.2% |
| Health systems research and programs | 6 | 18.2% |
| Health policy | 5 | 15.2% |
| International development and economics | 4 | 12.1% |
| Epidemiology/Medicine | 3 | 9.1% |
| Reproductive health | 3 | 9.1% |
| Anthropology | 2 | 6.1% |
| Health communications | 2 | 6.1% |
| Management | 1 | 3.0% |

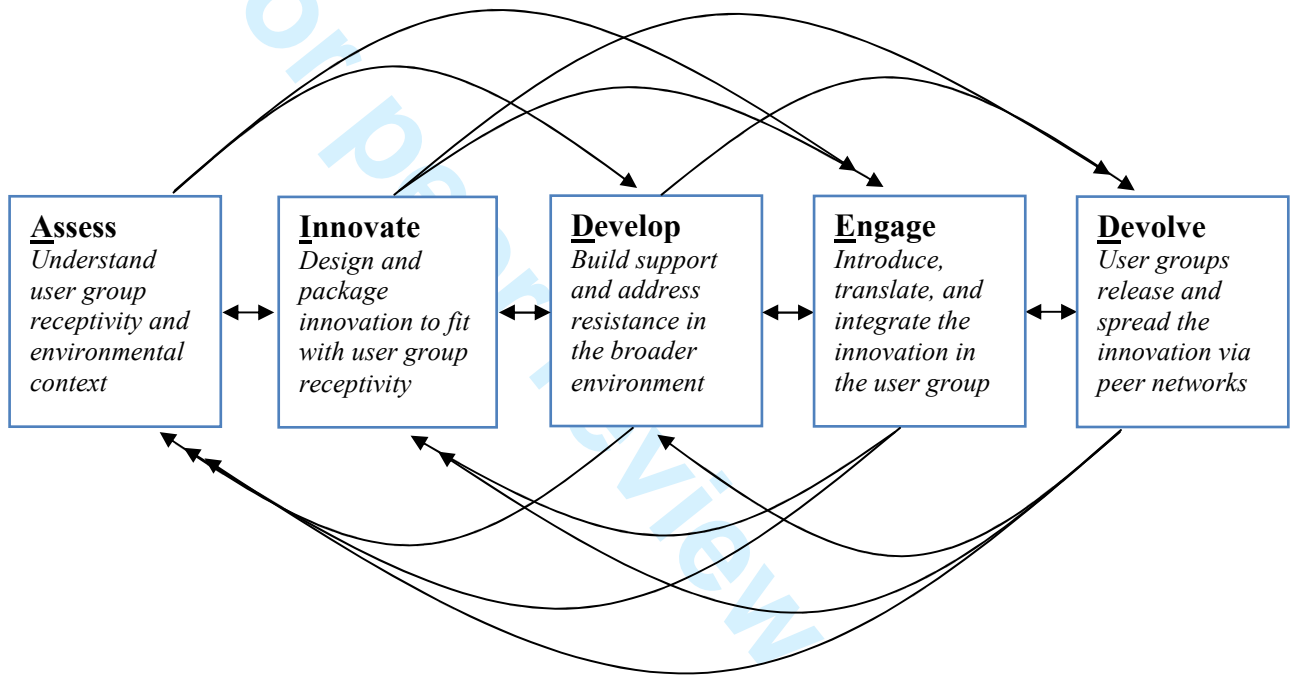
Table 2. Characteristics of peer-reviewed (n = 46 sources) and grey literature (n = 30 sources)

| Characteristic | Number (Percent) of Sources |
|---|-----------------------------|
| Methodology¹ | |
| Review of literature or existing data | 25 (33.3%) |
| Case study | 25 (33.3%) |
| Qualitative interviews, focus groups, observations | 14 (18.6%) |
| Cross-sectional study | 10 (13.3%) |
| Pre-post intervention study | 11 (14.6%) |
| Simulation study | 1 (1.3%) |
| Randomized controlled trial | 1 (1.3%) |
| Mixed methods | 1 (1.3%) |
| Geographic Region (as defined by the World Bank)¹ | |
| Africa | 26 (26.5%) |
| East Asia and Pacific | 23 (23.5%) |
| South Asia | 20 (20.4%) |
| Latin America and Caribbean | 15 (15.3%) |
| General/None stated | 12 (12.2%) |
| North Africa and the Middle East | 2 (2.0) |

¹ Percentages sum to more than 100% because some articles had more than one methodology and/or had covered multiple regions

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Figure 3. Schematic of the AIDED model of scale up





**A MODEL FOR SCALE UP OF FAMILY HEALTH INNOVATIONS
IN LOW- AND MIDDLE-INCOME SETTINGS: A MIXED
METHODS STUDY**

| | |
|---------------------------------|--|
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| Secondary Subject Heading: | Health policy, Public health |
| Keywords: | Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, International health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PUBLIC HEALTH, Scale up |
| | |

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Manuscripts

A MODEL FOR SCALE UP OF FAMILY HEALTH INNOVATIONS IN LOW- AND MIDDLE-INCOME SETTINGS: A MIXED METHODS STUDY

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AIDED model for scale up of family health innovations

Key words: scale up, family health, low-income settings, innovation, global health

Word Count: 5,573

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Abstract

Many family health innovations that have been shown to be both efficacious and cost-effective fail to scale up for widespread use particularly in low- and middle-income countries (LMIC).

Although individual cases of successful scale up, in which widespread take up occurs, have been described, we lack an integrated and practical model of scale up that may be applicable to a wide range of public health innovations in LMIC. We conducted a mixed methods study that included in-depth interviews with 33 key informants and a systematic review of peer-reviewed and gray literature. We focused on efforts to spread family health innovations broadly defined including the use of Depo-Provera, exclusive breastfeeding, community health workers, and family health oriented social marketing programs. We used the constant comparative method of qualitative data analysis to extract recurrent themes from the interviews, and we integrated these themes with findings from the literature review to generate the proposed model of scale up.

Objective

To develop an integrated and practical model of scale up that synthesizes experiences of family health programs in low and middle income countries (LMICs).

Design

Mixed methods study including in-depth interviews and a systematic review of peer-reviewed and gray literature.

Results

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3 The resulting model – the AIDED model – included 5 non-linear, interrelated components: 1)
4 assess the landscape, 2) innovate to fit user receptivity, 3) develop support, 4) engage user
5 groups, and 5) devolve efforts for spreading innovation. Our findings suggest that successful
6 scale up occurs within a complex adaptive system, characterized by interdependent parts,
7 multiple feedback loops, and several potential paths to achieve intended outcomes. Failure to
8 scale up may be attributable to insufficient assessment of user groups in context, lack of fit of
9 the innovation with user receptivity, inability to address resistance from stakeholders, and
10 inadequate engagement with user groups.
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23 **Conclusion**

24 Flexible strategies of assessment, innovation, development, engagement, and devolution are
25 required to enable effective change in the use of family health innovations in LMIC.
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3 All authors have completed the Unified Competing Interest form at
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5
6 http://www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author)
7
8 and declare: no support from any organisation for the submitted work; no financial
9
10 relationships with any organisations that might have an interest in the submitted work in the
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12 previous three years, no other relationships or activities that could appear to have influenced
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Introduction

Many family health innovations that have been shown to be both efficacious and cost-effective fail to scale up for widespread use particularly in low- and middle-income countries (LMIC). As of 2008, only 45% of married women in LMIC were using modern contraception and only 5% were using injectables (1), rates of exclusive breastfeeding for the first 6 months of life are reportedly at about 38% in LMIC (2), and much of Africa lacks potentially beneficial community health worker programs (3). Such limited use of these family health efforts persists despite ample evidence of their health benefits and cost-effectiveness.

Although individual case studies of successful scale up have been documented, we lack an integrated, practical model that synthesizes scale up experiences of family health programs in LMIC. Existing frameworks have identified factors that may influence scale up (4-7), including features of the innovation, the potential adopters, and the environment in which scale up occurs. Nevertheless, these broad domains provide limited guidance on the mechanisms of scale up, which are essential for guiding effective scale up efforts in family health.

Accordingly, we sought to synthesize the evidence from key informant experiences as well as peer-reviewed and gray literature to produce a practical model of scale up. For the purposes of our analysis, we refer to innovation as the use of products, practices, or approaches that, for the user, are new. We used Depo-Provera as an example of a product innovation, exclusive breastfeeding as an example of a health behaviour innovation, community health workers (CHWs) as an example of an organizational innovation, and social marketing as an example of business model innovation. Although these interventions have existed in some communities for decades, we consider them innovations in contexts and communities where they have not been

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3 used previously and are therefore new. These sample innovations provided lenses through which to
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6 examine scale up processes in family health in LMIC.
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8 **Methods**

9 *Study design and sample*

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11 We conducted a mixed methods study that included in-depth interviews and a
12
13 systematic review of peer-reviewed and gray literature. We chose to include a qualitative
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15 approach because this method is well suited for studying complex and nuanced social processes
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17 (8, 9) and for generating novel insights (8, 10, 11) through the use of inductive approaches.
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23 *In-depth interviews*

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25 We conducted in-depth interviews with 33 key informants who had a broad range of
26
27 experiences with scale up of the selected family health innovations in LMIC. As appropriate for
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29 theory development, we used purposeful sampling in which one seeks key informants who
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31 have knowledge about and will discuss the phenomenon of inquiry (8). We therefore sought
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33 informants with expertise in the different innovation types (Depo-Provera, breastfeeding,
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35 community health workers, and social marketing), with experience at different levels (front-line
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37 implementation, policy formulation, funding), in different geographical regions (sub-Saharan
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39 Africa, Middle East, Latin America, and South Asia), and working in different types of
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41 organizations and agencies (government, non-governmental organizations and foundations,
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43 United Nations, private sector, and universities). We developed the purposeful sample based
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45 on relevant peer-reviewed or gray literature, our team's professional networks, and the Bill &
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47 Melinda Gates Foundation (BMGF) staff, who had launched major initiatives in family health.
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49 We then employed snowball sampling (8) to enroll additional interviewees until we achieved
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3 theoretical saturation (8, 11), i.e., until successive interviews produced no new concepts, which
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5 occurred with 33 interviews. Ultimately, 15 of the 33 people interviewed had associations with
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7 the BMGF, although these individuals represented diverse professional backgrounds and
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9 relayed experiences that preceded their current role at the BMGF. Interviews were conducted
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11 by research team members experienced in qualitative interviewing; two researchers with
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13 complementary backgrounds conducted each interview using a standard interview guide
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15 **(Figure 1)** either in person or via telephone. The study was reviewed by the Yale Human
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17 Subjects Committee (IRB # 00000594) and granted an exemption under 45 CFR 46.101(b)(2).
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24 We used the constant comparison method (8, 11) to classify key concepts, expanding
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26 and refining properties of the codes with review of successive transcripts. We reconciled
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28 differences in coding through consensus and finalized a comprehensive code structure, which
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30 was systematically applied to all transcripts. We used ATLAS.ti Scientific Software, version 6.1,
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32 to facilitate organization, analysis, and retrieval of data.
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37 To improve the trustworthiness and reliability of the findings, we employed several
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39 methods recommended by experts in qualitative research (8). These included tape-recording
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41 interviews after consent, using a team of 5 data coders and analysts who reflected different
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43 disciplines, and retaining an audit trail of methods and coding decisions throughout the
44
45 analysis. For a subset of key informants, we used participant confirmation (8, 12) and
46
47 incorporated their additional insights from review of the initial findings. Additionally, after the
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49 interview and literature review data were synthesized, we conducted respondent validation
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51 (13). In this process, findings from the in-depth interviews and literature synthesis were shared
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3 with study participants to provide feedback; these reactions were addressed and accounted for
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6 in the analysis.

7 8 *Literature review*

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10 We conducted a systematic review of peer-reviewed and gray literature for each of the
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12 selected innovations. We included studies conducted in middle-income countries in the review
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14 because many countries that are today middle income (e.g., India, Brazil) were low income in
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16 the past. For each innovation, we searched for peer-reviewed literature in 11 electronic
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18 databases (MEDLINE, CINAHL, EMBASE, Web of Knowledge, PsycINFO, Global Health, EconLit,
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20 Social Sciences Citation Index, International Bibliography of Social Sciences, Social Services
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22 Abstracts, and Sociological Abstracts), including any literature published since the earliest date
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24 indexed in each database up to 2010. In addition, we searched the websites of 20 leading
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26 global health donors, implementers, and technical agencies to identify relevant gray literature
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28 (WHO, UNICEF, UNDP, UNFPA, the World Bank, the African Development Bank, the Inter-
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30 American Development Bank, the Asian Development Bank, USAID, CIDA, DFID, SIDA, GTZ, the
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32 Global Fund to Fight AIDS, Tuberculosis and Malaria, CARE, GAIN, Family Health International,
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34 Partners in Health, Management Sciences for Health, and John Snow, Inc.). All searches used a
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36 standard set of search terms related to dissemination, diffusion, scale up and sustainability and
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38 a tailored set of search terms specific to the innovation.
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48 For the peer-reviewed literature, we screened the abstracts of all search results and
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50 screened the full text of those articles retained following abstract screening. Screening was
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52 conducted independently by two team members to ensure consistent application of the
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3 predetermined exclusion criteria. An article was excluded if it did not meet the study's
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5 definition of the innovation, if it did not address dissemination, diffusion, scale up, or
6
7 sustainability of the innovation, if it did not address low- or middle-income countries, if it was
8
9 superficial in its discussion and/or did not provide empirical evidence about scale up of the
10
11 innovation, if the full text of the article was not available online, or if the article was not
12
13 available in English, French, Spanish, or Portuguese.
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17
18 Gray literature searches included any documents available via the organization's web
19
20 site on the February 2011 search dates. Due to the large volume of hits generated from these
21
22 Web site searches, the titles of all hits were screened first. If a document appeared relevant on
23
24 the basis of its title, the full text was reviewed using the same exclusion criteria as applied to
25
26 the peer-reviewed literature.
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30
31 Data extraction from the final sample of peer-reviewed and gray literature was
32
33 conducted independently by two research team members using a pre-established data
34
35 extraction form. The extraction form was used to list the enabling factors and barriers to
36
37 dissemination, diffusion, scale up, and sustainability. The resulting enabling factors and barriers
38
39 found in the literature for each innovation were then mapped to the 5 AIDED model
40
41 components to determine the degree of support in the empirical literature for the scale-up
42
43 process captured in the AIDED model. All authors reviewed the mapping, which was achieved
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45 through negotiated consensus and is illustrated in the **Appendix, Tables A1-A8**.
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Results

Description of samples

We interviewed a total of 33 key informants (**Table 1**). Our search of peer-reviewed literature returned 1,446 unique articles, of which 41 were retained for data extraction based on our review criteria; 4 additional papers not identified through the electronic search were obtained from the authors' files (**Figure 2**). Additionally, our search of the gray literature returned 30 unique sources for data extraction.

The AIDED model

Analysis of in-depth interview data and the synthesis of the peer-reviewed and gray literature revealed 5 interrelated components of the scale up process: assess the landscape, innovate to fit user receptivity, develop support, engage with user groups, and devolve efforts for spreading the innovation, which together comprise the AIDED model (**Figure 3**). The data highlighted the complexity and non-linearity of the process, which included multiple feedback loops. Key informants nonetheless indicated that donors and implementers rarely appreciated this complexity:

There's a lot of magical thinking about what this "pilot project" or "proof of concept" will do because it's not very real in terms of the stakes necessary to actually sustain for impact and scale. (Interview #3)

Assess the landscape. The first component involved obtaining a precise understanding of the receptivity of the user groups and of the environmental context of the user groups. Key informants suggested that a primary limitation of scale up efforts was poor understanding of what communities wanted and what made them receptive to the innovation; multiple studies

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2
3 (14, 15) highlighted the importance of conducting an in-depth assessment prior to launching
4
5
6 dissemination efforts.

7
8 In public health, there is often a lot of confusion between the need and the demand for
9 innovations. There is a tendency to approach the idea with, “okay, if I look at the
10 incidence of this particular disease and I know that this particular intervention can solve
11 that disease...then, why isn’t this diffusing more?” You have to work from what
12 consumers want. (Interview #23)

13
14
15
16 In addition, the assessment component included examining environmental conditions
17 that may promote or impede take up of the innovation. Key informants explained that such
18 conditions include the political, regulatory, economic, social, cultural, and technological
19 environments. Relevant assessments may span multiple levels from the local to the global, as
20 expressed by one key informant with regard to breastfeeding programs:
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28 Assessments occur at various levels. You have the assessment in the community to find
29 out the beliefs and practices in the community. You have opinion leader research...to
30 find out where you stand in terms of policies and their attitudes towards breastfeeding,
31 and then stakeholder analysis. So we have all those types of assessments at the very
32 beginning. (Interview #12)

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34
35
36 **Innovate to fit with user receptivity.** This component included adapting the innovation
37 to local context and preferences, so that receptive users would perceive the innovation as
38 providing relative benefits in their specific context or environment. Adaptation involved making
39 changes to the design and packaging of the innovation and was highlighted by key informants
40 and in the literature (14). Involvement of stakeholders from user groups at this early stage
41 facilitated matching between the innovation and user group receptivity. One key informant
42 highlighted the importance of precise fit to a particular context in the case of Depo-Provera:
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3 To activate this [the injection], it is very simple. A super simple device, it was not a hand-
4 me-down. This was reengineered for the developing country. There was no developed
5 country use for this technology at all. (Interview #1)
6
7

8 Non-technical features of the innovation design and packaging were also noted as
9
10 important. In the case of CHWs as an innovation, experts spoke about CHW task assignments,
11
12 role definitions, and community perceptions as examples of design and packaging. Key
13
14 informants highlighted how the visible benefits of using CHWs generated a perceived
15
16 advantage for the innovation, which was critical to its fit with the community needs and wants,
17
18 and subsequent take up:
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21

22
23 The community has to see CHWs as valuable. If they are doing something the
24 community really values, it will work....In Nepal, CHWs were valued by the community
25 mostly because [of] the Vitamin A program where the community health worker would
26 give Vitamin A to kids. And that lowered mortality fast, and the communities really
27 valued that. It raised the community health worker status quickly because they had
28 Vitamin A. [Also], kids are dying of pneumonia and [if] the community health worker
29 can save the kid by getting them to the right place and having medicines, then [the]
30 community values that. It is very visible. (Interview #11)
31
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34

35 **Develop support.** This component referred to priming the environment to be supportive
36
37 of increased use of the innovation. Developing support involved enhancing education as well as
38
39 identifying and addressing resistance to the innovation. Key informants described resistance
40
41 from groups that might suffer economic or political losses if the innovation became routine
42
43 practice:
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45
46

47 What you hear at the ministries of health is from people whose livelihood may be
48 affected or whose turf or influence they think is being diminished. So, you know, nurses
49 in Kenya right now...we are getting from the nursing association that we have
50 unemployed nurses in Kenya. Why should we have community workers giving Depo
51 injections ...the midwives and doctors will give similar answers and... it turns out to be a
52 turf battle. (Interview #14)
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3 Involving these groups in assess and innovate components was also viewed as helpful to
4
5 addressing resistance and building support. In adequate development of support and emerging
6
7 resistance from stakeholders were common reasons cited for failure of scale up efforts in the
8
9 literature (16-19). Key informants emphasized the importance of strategic networking and
10
11 collaboration in the development of political and economic support and support at the regional,
12
13 national, and global levels.
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17
18 If you understood the political science and the political economy you'd see actually what
19
20 I need to do is I need to target policy makers first. (Interview #5)
21

22 One [effort is] focused at the policy level and working with decision makers...getting
23
24 them the information that they need to then further promote or, if they are not already
25
26 convinced, to help them be convinced. (Interview #14)
27

28 Legal and regulatory action that supported the innovation also played a critical role according
29
30 to key informants. For instance, in the case of exclusive breastfeeding, both key informants and
31
32 the literature (17, 19, 20) noted the importance of legislation in providing paid maternity leave
33
34 and curbing the marketing of substitutes for breast milk in several countries including Brazil:
35
36

37 Another important aspect that came...were the policies that were...elected by the
38
39 government...[it was] decided to provide four months of paid maternity leave to formal
40
41 working women....so '88 came this decision, this law, and also in 1988...an approval of
42
43 the National Code of Marketing of Breast-Milk Substitute...also important for the
44
45 continuation of the pro-breastfeeding campaign. (Interview #22)
46

47 Understanding and addressing resistance was often accomplished by using data, in
48
49 some cases from controlled trials funded in the country and in other cases through more non-
50
51 traditional forms of data. For instance, the highly successful scale up of CHWs in Pakistan
52
53 involved building political support through evidence-based advocacy:
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3 We spent a year collecting and generating local data from the district on perinatal
4 mortality, its distribution, and causes of death. This more than anything was critical in
5 focusing the attention of the local politicians and policy makers. [We] made several
6 presentations to the Minister of Health and the Director General ...to persuade them of
7 the importance of doing something and getting the buy-in from the program people.
8 (Interview #27)
9
10

11
12 Key informants underscored the role of economic incentives in developing support for
13 the innovation and to propel scale up. In the case of Depo-Provera, for instance, key informants
14 discussed the importance of developing sufficient incentives to produce, sell, and buy the
15 product:
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22 It's really not rocket science. You get a product; you put it in a box....If it's cheap
23 enough, people will buy it. If it's too cheap, retailers won't stock it. Play with those two
24 variables. The margins have to be attractive to those within the retail chain, but the end
25 price has to be affordable to the consumer. (Interview #7)
26
27

28 You promise [the manufacturer] more volume, asking them for lower margins. And the
29 premise was that that drug now would go to the supply chain and end up at the
30 frontline at between 30 and 50 cents, more or less. (Interview #3)
31
32

33 Economic disincentives were noted as major sources of resistance, particularly in the areas of
34 exclusive breastfeeding and use of CHWs, which were viewed by infant formula companies and
35 clinicians, respectively, as crowding out their businesses. As a key informant said:
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41 Despite their desire to breastfeed, [women] cannot do it because of economical
42 reasons, social reasons...what kind of incentives should be given to women and families
43 in order to increase the prevalence of choosing breastfeeding....It's a competition
44 between different priorities that women go through. It's not that they don't want to.
45 They have to do something else, to go to work. So the financial incentives would be
46 important I think and that has not been done. (Interview #8)
47
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49

50 **Engage with user groups.** Engagement with user groups was viewed by key informants
51 as occurring throughout the scale up process and involved several necessary steps: 1)
52 introduction of the innovation from outside the user group to inside the user group via
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1
2
3 boundary spanners, 2) translation of the innovation so that user groups could assimilate the
4
5 new information, and 3) integration of the innovation into the routine practices and social
6
7 norms of the user group.
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11 Introduction of the innovation, the first part of the engage component, referred to
12
13 giving information about the innovation to the user group. Critical to the process, however, was
14
15 that this introduction be accomplished by someone who had an essential, pre-existing role in
16
17 the user group and who also has contact with people outside the potential user group, i.e.,
18
19 someone who was a boundary-spanner. Translation, the second part of the engage component,
20
21 was the process that made the new information clear and understandable to potential user
22
23 groups, allowing it to be assimilated. Translation included the development of practical
24
25 instructions, guides, blueprints, and protocols that were comprehensible and relevant for the
26
27 user group. In reflecting on the success factors in implementing the community health worker
28
29 model in Nepal, one key informant described how people in the community collaborated in
30
31 translation:
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39 One of the reasons the manual was particularly good [was] ...we contracted with the
40
41 literacy group and with UNICEF because they had the only good artists...And the three
42
43 groups [the literacy group, UNICEF, and the Ministry] had to work together to produce
44
45 the sort of communications...that worked with the CHWs. (Interview #11)

46
47 Translation also included more subtle ways to contextualize or frame the innovation in a way
48
49 that made it appealing to larger numbers of people in the user group, such as describing the
50
51 innovation using local idioms, stories, or historical examples, or associating the innovation with
52
53 important values or practices within the group.
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3 We realized that the best [health] counsellors were our cleaning ladies because they
4 knew how to talk with the ladies. They knew the vocabulary, you know....They were
5 from the same neighbourhoods...They were more or less the age of the ladies...They
6 were also mothers having the same problems. They talked to them very easily, not
7 [acting as if] I am the boss here...I think it feels as if they were having a conversation.
8 (Interview #21)
9
10

11
12 In some examples, translation occurred via opinion leaders, such as in a reproductive health
13 project in Afghanistan that disseminated information about contraception, including Depo,
14 through religious leaders. The project avoided national religious policy debates but engaged
15 religious leaders at the community level in discussions of the compatibility of contraception
16 with teachings from the Quran. To accomplish this, the contraception was described not as a
17 method of family planning, which would have been controversial, but instead was described as
18 the best way to ensure women could breastfeed for two years, which was the duration
19 prescribed in the Quran:
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32 So the one-on-one discussions with the 37 mullahs in these 3 project areas... [the
33 project manager] had these discussions and...and then all of them could agree that this
34 was okay and it was consistent with Islam. (Interview # 30)
35
36

37 Once religious leaders were convinced about the fit of the innovation with their values, these
38 leaders then endorsed the use of contraception in the broader community.
39
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42 So the mullahs as part of their organizing the community [said] here's how we're going
43 to cover the 3,000 people in our community; we've laid out these plans. We'll make sure
44 that these happen, and I will also talk with the men at Friday prayers about
45 contraception. (Interview #30)
46
47

48 The final aspect of the engage component, integration, referred to the embedding of the
49 innovation in the routines and social norms of a user group. Integration was enabled by
50 support through legislation, educational systems, and changes to broader cultural norms
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3 beyond the immediate user group. For instance, a key informant described this kind of
4
5
6 integration relative to breastfeeding in Brazil:
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8 The behaviour change comes with this facilitation [by] the facilities that the woman
9 finds in society. Instead of being sent out of the bus because she's breastfeeding or out
10 of the health centre because she's breastfeeding, on the contrary, she is well received
11 so this behaviour became normal. (Interview #22)
12
13

14
15 In other instances, the innovation became part of what was taught and passed down to future
16
17 generations, reflecting its integration into the routine practices of the user group and its
18
19 sustainability over time. For instance, the CHWs in Nepal who grew too old to work passed the
20
21 position down to their daughters. The position was viewed as an honour as it was believed to
22
23 contribute to one's *dharma* for community service (21), which was thought to increase their
24
25 acceptance in what they understood as the "afterlife."
26
27
28

29 Each of the communities wanted to be a quality midwife and to wear the brand of a
30 Bidan Delima. There was an advertisement campaign, but much more so, it was a peer
31 pressure, a sisterhood....Women stayed as CHWs for their career, and they ended up
32 passing it down to their daughters. Now that is sustainability! (Interview #10)
33
34
35

36 **Devolve efforts for spreading the innovation.** This component involved user groups'
37
38 releasing and spreading the innovation for its re-introduction in new user groups within their
39
40 peer networks. Key informants underscored the importance of peer networks in facilitating the
41
42 process of release and spread to new user groups, suggesting that trust among the network
43
44 members was essential, as described in these examples:
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46
47

48 We're having huge success now in family planning in Africa by putting early adopters to
49 counsel other women...I think we are seeing a real normative change in a whole bunch
50 of communities in which we operate around family planning, IUDs, sterilization,
51 injectables because, you know, you get women talking to other women. (Interview #19)
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3 Key informants noted that relinquishing control over the innovations' spread was
4 ultimately necessary for full scale up; however, doing so presented risks, particularly when the
5
6 ultimately necessary for full scale up; however, doing so presented risks, particularly when the
7
8 timeline for this transition occurred too soon. Key informants highlighted that "some
9
10 innovations have some negative and positive spinoffs" (Interview #11). Positive spinoffs of
11
12 spread included the take up of innovation complements. For example, key informants
13
14 described how increasing the use of CHWs also spread messages and services that they
15
16 promoted, such as antenatal care, better hygiene, HIV testing, and other public health efforts.
17
18 In contrast, negative unintended consequences were also identified and some key informants
19
20 voiced concerns that scale up success should be determined based on comprehensive
21
22 monitoring and evaluation efforts.
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28 We need a balanced view and measurement impact because sometimes things [can
29 have negative effects]. Think about the pneumonia vaccine. It is good, but it increases
30 illness too maybe. If we can predict that ahead of time, we can plan for it and maybe
31 lessen the negative impacts. (Interview #11)
32
33

34 **Linkages among the components**

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36 Although the model that emerged identified 5 common components, key informants
37
38 cautioned that there was no single, definitive way to achieve effective scale up in every context.
39
40 Rather, they noted the "myth of the magic bullet (Interview #23)," which was summarized by
41
42 explaining that "these things are often very contextual, and there isn't a magic bullet. Just
43
44 because something worked well in one country, doesn't mean it's going to work elsewhere"
45
46 (Interview #23). Hence, specific actions and strategies within each component remain context-
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Discussion

We identified 5 distinct but interrelated components that comprised the AIDED model of scale up for selected family health interventions in LMIC: assess the landscape, innovate to fit user receptivity, develop support, engage with user groups, and devolve efforts for spreading the innovation. Critical to implementing such an approach is the recognition that the progression through these components may be nonlinear and involve multiple feedback loops, which can necessitate reversions to previous components. The model further indicates that successful scale up is not fully under the control of the innovator, donor or implementer but rather grows organically out of a deep understanding of and engagement with user groups and their environmental contexts.

Although the concepts that emerged from the in-depth interviews and from the systematic literature review were largely consistent, important distinctions between the two data sources were also apparent. For instance, we gathered more evidence about the component of “assess” from in-depth interviews than from empirical literature. Interviews highlighted the multiple levels of assessment undertaken in successful scale up efforts including assessment of community receptivity, political support, economic viability, and technical feasibility, whereas studies in the empirical literature mentioned assessment in general terms or of only a single type (e.g., community needs assessment). Some empirical studies reported only post-launch phases of the intervention and therefore did not include information about pre-launch assessment, perhaps due to space constraints or the perceived lack of novelty of such information. We also gathered more evidence about the devolve component from the in-

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3 depth interviews than from empirical papers, which often reported data to demonstrate
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5
6 widespread uptake but with more limited description of the specific processes used.
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9 Additionally, the in-depth interviews produced richer detail about failures to scale up with
10
11 views about the reasons for failure, which were less well documented in the literature. The
12
13 distinctions highlight the importance of triangulation (8), i.e., using multiple sources of data, to
14
15 understand complex systems issues and underscore the limitations of empirical literature,
16
17 which may omit key insights about how scale up has been achieved and underemphasize null
18
19 findings and failures in scale up.
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21

22
23 Despite the widespread agreement about recurrent themes related to the components
24
25 of the AIDED model, some heterogeneity existed. For instance, interviewees differed in the
26
27 degree to which they believed that scale up success required private market strategies. Some
28
29 thought that adequate ongoing government and foundation support was sufficient to promote
30
31 widespread take up while others viewed a private market-based incentive system to be
32
33 essential. Still others highlighted that the importance of private market versus public sector
34
35 involvement depended on the type of innovation. Depo-provera, for instance, was viewed by
36
37 some as being conducive to market-based spread whereas the community health worker model
38
39 was believed to require ongoing public sector support to be effective as an integral part of the
40
41 public health system. A second area of heterogeneity across the in-depth interviews was the
42
43 degree to which successful scale up initiatives followed a top-down approach in which
44
45 ministries of health and high-level decision makers promoted the innovation or a bottom-up
46
47 approach in which the user community drove the adoption. Although the interviewees
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3 reflected on the importance of support among all levels, views differed in the ordering of
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6 attaining that support, underscoring our conclusion that the process is nonlinear and may
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8
9 unfold in diverse sequences without a single path to successful scale up.

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11 The findings suggest that the process of scale up is dependent on a complex adaptive
12
13 system, which includes several interlocking parts, multiple feedback loops, and many potential
14
15 pathways to success. The emergent and somewhat unpredictable nature of complex adaptive
16
17 systems has several implications for policymakers, practitioners, and researchers. First, real-
18
19 time, valid information flow across the system is essential to effective scale up. Because actors
20
21 in the system adapt based on what they understand as environmental conditions,
22
23 misinformation can create suboptimal situations quickly. Therefore, investments in the data
24
25 infrastructure and the relationships that underpin valid and reliable information flow are
26
27 paramount. Second, the achievement of widespread innovation use is the result of a multi-
28
29 factorial process and cannot be attributed simply to specific, planned actions. Because there
30
31 are multiple paths to the same outcome, system interventions that include coordination of
32
33 multiple levels of action (e.g. global, national, local) are most likely to produce successful scale
34
35 up. Cost-effective management information systems are required for providing the level of
36
37 coordination needed. Last, because the full outcomes are somewhat unpredictable in complex
38
39 adaptive systems, it is important to anticipate unintended negative consequences that may
40
41 emerge and to develop contingency plans for these potential occurrences. Furthermore, careful
42
43 attention to incentives and accountability systems to limit negative consequences is essential to
44
45 ethical and effective efforts to disseminate and diffuse innovations.
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3 How does the AIDED model add to existing frameworks for scale up? Several experts
4
5 have described important frameworks for scale up in low-income countries (4, 7, 22, 23) and in
6
7 higher-income settings (5, 24-26). Although frameworks differ in their emphasis and
8
9 comprehensiveness, together these provide a list of domains of variables that may be
10
11 important for scale up. These include: 1) attributes of the innovation, largely drawn from
12
13 Rogers' work suggesting innovations are more likely to spread if they have relative advantage as
14
15 perceived by users, are easy to understand and use, are compatible with current practices, can
16
17 be tested before large-scale adoption, and have observable results, 2) attributes of the
18
19 resource system and implementers (i.e., the systems that produces and implement the
20
21 innovation) such as their credibility, understanding of the environment, technical skills, and
22
23 management capacity, 3) attributes of the adopting community or user groups including their
24
25 perceptions of need, readiness to change, capacity to absorb innovations, and engagement in
26
27 the process, and 4) attributes of the socio-political and economic environment including how
28
29 conducive it is to fostering spread. Some frameworks have also highlighted the importance of
30
31 the chosen delivery strategy (4) including tailoring the distribution efforts to local situations and
32
33 using existing social networks (4, 5, 25) to promote spread. In contrast to providing a list of
34
35 important attributes, the AIDED model both provides a theory of the interrelated actions
36
37 important for to scale up and organizes them into 5 concrete, clearly defined components.
38
39 Concepts from existing frameworks, such as relative advantage as perceived by user groups and
40
41 the role of the environment, pertain to the AIDED model. Our findings, however, provide
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43 practical guidance for how one might plan and implement scale up efforts. Additionally, our
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3 findings highlight the interactions among the different components of scale up, suggesting that
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5 multiple paths may lead to widespread take up of innovations.
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8 To facilitate the practical application of the AIDED model, we developed a template of
9
10 activities, outputs, outcomes, outcome indicators, and means of measuring progress for each of
11
12 the 5 components (**Figures 3 and 4**) as well as a set of flow charts illustrating the application of
13
14 the AIDED model. (See **Appendix, Figures A1-A5**). These matrices and flow charts facilitate the
15
16 application of the AIDED model in implementation and evaluation of efforts to disseminate,
17
18 diffuse, and scale up innovations in low-income settings. Over time, such a tool could be refined
19
20 with application and validated to ensure that the activities identified are those associated with
21
22 more successful scale up.
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28 Our findings should be interpreted in light of several limitations. The inductive approach
29
30 used to construct the AIDED model did not allow for simultaneous empirical testing of the
31
32 model. Future research is needed to test the AIDED model in diverse contexts. Additionally,
33
34 many of the interviewees were affiliated with the BMGF. This foundation is managing \$1.5
35
36 billion in family health programs and has a highly diverse staff with deep experience and
37
38 expertise in this area including prior to their affiliation with the BMGF. Nevertheless, this may
39
40 limit the transferability of our findings to other contexts. Furthermore, the literature may have
41
42 publication bias (27) in which negative studies are underrepresented, and interviews may have
43
44 social desirability bias (28), in which participants may have misrepresented their experiences in
45
46 order to provide desirable answers. Nonetheless, we did find cases of unsuccessful scale up in
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48 the literature, and we probed intentionally to elicit both positive and negative experiences from
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3 key informants in order to minimize bias. Last, the AIDED model did not address long term,
4
5 sustained use of innovations that are successfully scaled up. This will require longitudinal
6
7 research examining contrasting levels of success sustaining the scaled up innovations in
8
9 different settings.
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13 In sum, we identified 5 key components, which our findings suggest interact in a
14
15 complex adaptive system to explain the process of widespread take up and anticipate the
16
17 success of scale up efforts. Paradoxically, complex adaptive systems are at once capable of fast
18
19 and sweeping changes and homeostatic. Despite substantial changes that can occur within a
20
21 complex adaptive system, each part of the system responds to disturbances in such a way that
22
23 the system can maintain the status quo. We identified in this paper several leverage points for
24
25 launching substantial changes in large systems. Nevertheless, recognizing the fundamental
26
27 complexity of the scale up process, funders and innovators alike will require flexible strategies
28
29 of assessment, innovation, development, engagement, and devolution to enable effective
30
31 change in the use of family health innovations in LMIC.
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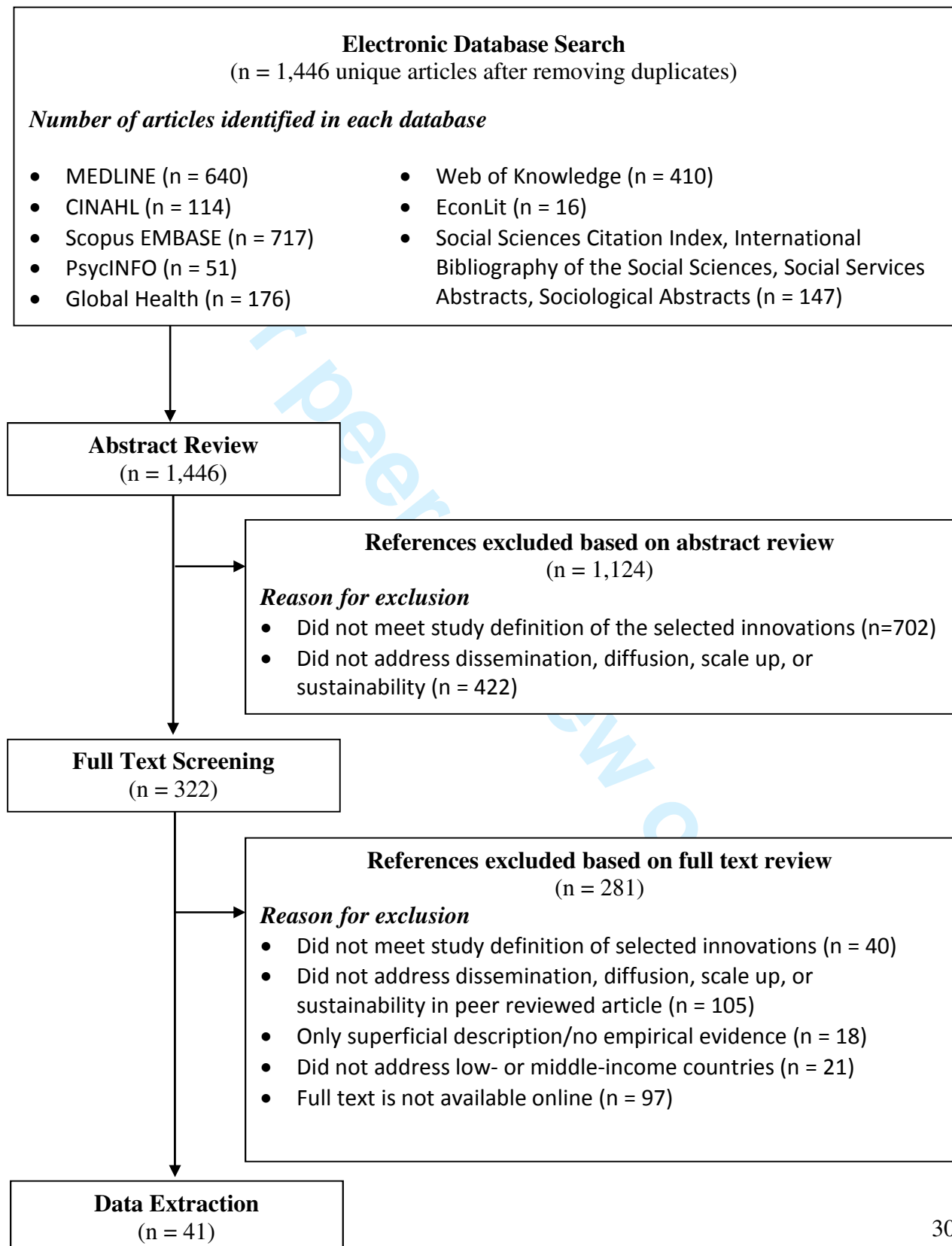
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3 **Figure 1. Discussion guide used in key informant interviews.**
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- 6 1. Let's start by having you describe your role in implementing this intervention. What
7 was your role and how long were you involved?
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 - 9
 - 10 2. We are interested in your experience with scaling the intervention. What was the
11 process, from implementation to scale-up of the intervention? Walk me through that.
12
 - 13
 - 14 • What was the goal?
 - 15 • How did you first approach addressing the issue and implementing the intervention?
 - 16 • What were the key components of the process?
 - 17 • Did you come to the process with any pre-conceived ideas about how you would
18 accomplish the task? Can you describe those?
 - 19 • How did you/are you measuring success?
 - 20
 - 21
 - 22
 - 23 3. What kinds of challenges came up and how did you handle those?
24
 - 25 4. Looking back, is there anything that might have been done differently?
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 - 27
 - 28 5. Is there anything else we should have asked to help us understand your experience with
29 the intervention and process of implementation and scale-up better?
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Figure 2. Selection of peer-reviewed literature^{1,2}

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7 ¹ During the review, 4 additional papers not identified through the electronic search were
8
9
10 obtained from the authors' files, resulting in a total of 45 peer-reviewed articles for review.

11 ² Gray literature was obtained from the following Websites: WHO, UNICEF, UNDP, UNFPA, the
12
13 World Bank, the African Development Bank, the Inter-American Development Bank, the Asian
14
15 Development Bank, USAID, CIDA, DFID, SIDA, GTZ, the Global Fund to Fight AIDS, Tuberculosis
16
17 and Malaria, CARE, GAIN, Family Health International, Partners in Health, Management
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19 Sciences for Health, and John Snow, Inc.
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Table 1. Characteristics of key informants

| Characteristic | Number | % |
|---|--------|-------|
| Area of expertise | | |
| Family planning (Depo-Provera) | 7 | 21.2% |
| Social marketing | 6 | 18.2% |
| Policy making | 6 | 18.2% |
| Community health worker approaches | 5 | 15.2% |
| General | 5 | 15.2% |
| Breastfeeding | 4 | 12.1% |
| Affiliation | | |
| Nongovernmental organization | 20 | 60.6% |
| Government | 4 | 12.1% |
| United Nations agency | 3 | 9.1% |
| Consultancy | 3 | 9.1% |
| Academic | 3 | 9.1% |
| Disciplinary background | | |
| Maternal and child health | 7 | 21.2% |
| Health systems research and programs | 6 | 18.2% |
| Health policy | 5 | 15.2% |
| International development and economics | 4 | 12.1% |
| Epidemiology/Medicine | 3 | 9.1% |
| Reproductive health | 3 | 9.1% |
| Anthropology | 2 | 6.1% |
| Health communications | 2 | 6.1% |
| Management | 1 | 3.0% |

Table 2. Characteristics of peer-reviewed (n = 46 sources) and gray literature (n = 30 sources)

| Characteristic | Number (Percent) of Sources |
|---|-----------------------------|
| Methodology¹ | |
| Review of literature or existing data | 25 (33.3%) |
| Case study | 25 (33.3%) |
| Qualitative interviews, focus groups, observations | 14 (18.6%) |
| Cross-sectional study | 10 (13.3%) |
| Pre-post intervention study | 11 (14.6%) |
| Simulation study | 1 (1.3%) |
| Randomized controlled trial | 1 (1.3%) |
| Mixed methods | 1 (1.3%) |
| Geographic Region (as defined by the World Bank)¹ | |
| Africa | 26 (26.5%) |
| East Asia and Pacific | 23 (23.5%) |
| South Asia | 20 (20.4%) |
| Latin America and Caribbean | 15 (15.3%) |
| General/None stated | 12 (12.2%) |
| North Africa and the Middle East | 2 (2.0) |

¹ Percentages sum to more than 100% because some articles had more than one methodology and/or had covered multiple regions

Figure 3. Schematic of the AIDED model of scale up

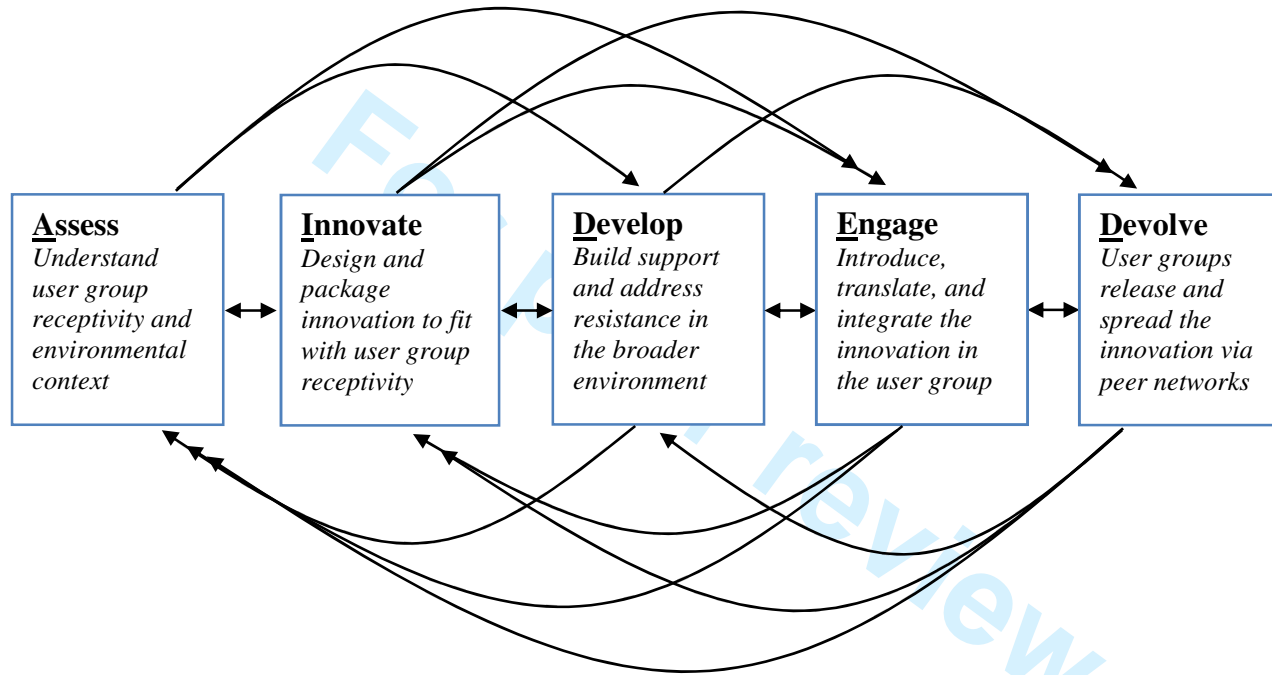


Figure 4. AIDED model activities and outputs.

| <u>Component</u> | <u>Activities within component</u> | <u>Outputs from activities</u> |
|------------------|---|--|
| ASSESS | 1. Landscape assessment | 1. Mapping of environmental conditions that would support or be barriers to use of the innovation in its pre-existing form has been created |
| | 2. User group needs assessment | 2. List of prioritized needs and wants of the index user groups has been compiled and reviewed with members of index user groups; : understanding of user group's receptivity to the innovation is clear |
| | 3. Readiness for change assessment | 3. Measure of readiness for change in the area of the innovation has been developed and evaluated |
| INNOVATE | 1. Tailor design and packaging of innovation to index user groups' needs/wants | 1. Well-tailored innovation has met index user groups' needs/wants identified in assess component; innovation has been adapted to fit the receptivity of the user group |
| | 2. Test market (e.g., conduct focus groups of index user group members to determine 'fit' and willingness to pay) | 2. Test marketing results have been synthesized for review |
| DEVELOP | 1. Cultivate support among high-level champions | 1. High-level champions have manifested their support for the innovation |
| | 2. Promote policy reforms | 2. Needed policy reforms have been enacted |
| | 3. Facilitate knowledge sharing and technology transfer | 3. Mechanisms for knowledge sharing and technology transfer have been established or needed knowledge/technology has been acquired |
| | 4. Employ social marketing techniques to foster new norms | 4. Social marketing campaigns have leveraged cultural norms to build support for the innovation |

| | | | |
|---|----------------|---|--|
| 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 | ENGAGE | <ol style="list-style-type: none"> 1. Identify boundary spanners and introduce them to innovation 2. Develop tools and collaborations to assist in translation of the innovation within index user groups <p><i>Inside index user groups:</i></p> <ol style="list-style-type: none"> 3. Translate innovation to facilitate integration into index user groups' norms 4. Integrate innovation into index user groups' norms 5. Encourage adaptation and replication of innovation within index user group | <ol style="list-style-type: none"> 1. Boundary spanners with pre-existing roles within the user groups have been identified and are introducing innovation in index user groups 2. Tools for translation, developed in collaboration with people in index user groups, exist <ol style="list-style-type: none"> 3. Innovation has been translated into terms that are accessible, familiar, and attractive to index user groups 4. Index user groups feel ownership over the implementation of the innovation 5. Adapted and replicated versions of the originally introduced innovation have emerged from index user groups |
| | DEVOLVE | <ol style="list-style-type: none"> 1. Map social networks of index user groups along which innovation may spread 2. Facilitate movement of innovation across the boundary (from inside to outside) of index user groups 3. Introduce innovation to boundary spanners from other (non-index) user groups | <ol style="list-style-type: none"> 1. Social network mapping (to use as basis for determining which other user groups to monitor for subsequent knowledge/use of innovation) 2. Innovation has been shared by members of index user groups with external parties who share similar receptivity to the innovation 3. Boundary spanners from other (non-index) user groups have been exposed to the innovation |

Note: The model takes as its starting point that an innovation exists in some form, and addresses the question of how to scale up use of that existing innovation

Figure 5. AIDED model outcome measures

| <u>Component</u> | <u>Outcome of component</u> | <u>Outcome indicator</u> | <u>Means of measuring outcome indicator</u> |
|------------------|---|---|--|
| ASSESS | Identification of changes needed in (a) the innovation itself, (b) the environment, or (c) the user group in order to support use of the innovation in index user groups (<i>(a) is addressed in innovate component, (b) in develop component, and (c) in engage component</i>) | Documentation of changes needed in innovation, environmental conditions, and user groups in order to support use of the innovation in index user groups | Synthesis report of the assessments completed |
| INNOVATE | Achievement of acceptable threshold of fit between innovation and index user groups | Degree of 'fit' of innovation to index user groups | Results from test marketing (focus groups, willingness to pay studies, market analysis) |
| DEVELOP | Barriers to the innovation have been mitigated and support for the innovation has been secured in the political, regulatory, economic, socio-cultural, technological, and knowledge environments of index user groups | Degree of support for innovation in political, regulatory, economic, socio-cultural, technological, and knowledge environments | Required environmental changes identified in the assess component have all been addressed; Stakeholder analysis; Follow-up landscape assessment to identify any new barriers that have emerged |
| ENGAGE | <p>a. Innovation is in use by a target percentage in index user groups (i.e., number of users divided by the total members in index user groups)</p> <p>b. Innovation is perceived as 'standard' by target percentage in index user</p> | <p>a. Extent of knowledge, perceptions, and use of innovation in index user groups</p> <p>b. Degree to which innovation is perceived as 'standard' by</p> | Primary data collection in index user groups regarding use and perceptions of innovation (could include surveys, in-depth interviews, focus groups, participant observation) |

| | | | |
|---|--|--|---|
| 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 | <p>groups</p> <p>c. Innovation is evolving to be more compatible with local social norms due to adaptation efforts by index user groups</p> <p>DEVOLVE</p> <p>a. Index user groups have shared the innovation with other user groups</p> <p>b. Innovation is in use by target percentage in user groups beyond index user groups</p> <p>OVERALL AIDED MODEL</p> <p>Intended health impact is realized in the target population</p> | <p>index user groups</p> <p>c. Degree to which adapted innovations are faithful to originally introduced innovation (in impact)</p> <p>a. Level of awareness of innovation in larger set of user groups</p> <p>b. Extent of knowledge, perceptions, and usage of innovation in larger set of user groups</p> <p>Change in relevant target population health indicators</p> | <p>Primary data collection in index user group regarding awareness and use of innovation (e.g., surveys, in-depth interviews, focus groups, participant observation)</p> <p>Population surveys, surveillance data</p> |
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APPENDIX

For peer review only

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Table A1. Enabling factors for the dissemination, diffusion, scale up, and sustainability of Depo-Provera by AIDED model components

| Enabling factor | # sources citing factor | AIDED model component(s) mapped to factor |
|--|-------------------------|---|
| Development of delivery system supports (training of health workers/field motivators, creation of training manuals or checklists, supply chain improvements, recruitment of women, chart tracking) | 9 | Develop |
| Tailoring innovation to existing system capacity (CBD systems already in place, women in CHW roles, other existing program infrastructure (ie. Well baby clinics), current supply chain flows) - | 8 | Innovate |
| Landscape or stakeholder assessment | 6 | Assess |
| Use of social networks | 5 | Devolve |
| Collaboration with stakeholders to identify or creating supportive structures in the economic, political and technological spheres | 5 | Assess, Develop |
| Dialogue with community at early stages | 5 | Assess, Engage |
| Effective education through social marketing re: risks and instructions (including community input) | 4 | Develop, Engage |
| Piloting to determine feasibility | 3 | Assess |
| Innovation design features (injectable at 3 month intervals) | 3 | Innovate |
| Ensuring 'fit' with cultural norms (can take in secret) | 3 | Assess, Innovate |
| Use of data to improve program performance | 3 | Engage |
| Nationalistic messaging (population control, etc.) | 2 | Develop |
| Adherence to religious norms (support of leaders) | 1 | Innovate, Develop, Engage |
| Identifying potential sources of resistance, such as from the professional medical community | 1 | Assess |
| Creating structures to ensure use of assessment findings through implementation and scale up (e.g., the same individuals that conducted the assessment remained involved through the process of scaling) | 1 | Assess |

Table A2. Barriers to the dissemination, diffusion, scale up, and sustainability of Depo-Provera by AIDED model components

| Barrier | # sources citing factor | AIDED model component(s) mapped to factor |
|---|-------------------------|---|
| Lack of system capacity (delivery/administrative challenges, lack of equipment, supply chain stockouts due to mismanagement, staff burden) | 5 | Innovate, Develop |
| Rural nature of program areas (made supply chain and human resource chain difficult to maintain) | 5 | Devolve |
| Inadequate resources for scaled-up activities (declined as expansion proceeded) | 4 | Devolve |
| Competing alternatives (in family planning product; eg. other brand names, delivery sector; eg. public vs private) | 3 | Develop |
| Misaligned government policies and priorities (favored HIV/AIDS projects, within FP, emphasized long acting methods, favored provision of FP through medical personnel) | 3 | Assess, Develop, Devolve |
| Data collection challenges (contact between front line and supervisors too rare, front line not understanding tools, follow-up challenges etc.) | 3 | Develop |
| Social/cultural norms (male dominance/power concerns about fidelity and family size; mothers in law) | 1 | Assess, Innovate, Engage, |
| Lack of knowledge/awareness (inadequate counseling/patient education/lack of patient centered care, information sharing) | 1 | Develop, Engage |
| Opposition by medical professionals | 1 | Assess, Engage |
| Lack of ongoing stakeholder support (key leaders left after pilot phase) | 1 | Devolve |

Table A3. Enabling factors for the dissemination, diffusion, scale up, and sustainability of exclusive breastfeeding by AIDED model components

| Enabling Factor | # sources citing factor | AIDED model components mapped to factor |
|--|-------------------------|---|
| <u>Contextual</u> | | |
| International advocacy groups: IBFAN, WABA | 5 | Develop |
| Evidence-based recommendations: timely initiation of BF; EBF for 6 months (WHO) | 5 | Develop |
| International consensus meetings/declarations: Bellagio and beyond | 8 | Develop |
| <u>Political support</u> | | |
| Cost/savings analyses | 6 | Assess |
| Local advocacy & coalition building, including public opinion leaders | 8 | Develop |
| Civil society mobilization & engagement | 6 | Develop |
| Political sensitization | 6 | Develop |
| Political will | 6 | Develop |
| Long term commitment to scaling-up | 9 | Devolve |
| <u>Process and sustainability facilitators</u> | | |
| Research and evaluation | | |
| Baseline facility and community needs assessments | 7 | Assess |
| Operational (formative) research/pilot studies | 8 | Assess |
| Program delivery | | |
| Facility-based delivery system: e.g., BFHI | 8 | Innovate, Develop, Engage, Devolve |
| Community-based EBF promotion & support: baby friendly primary health care units, peer counselors, community health workers, mother-to-mother support groups | 8 | Innovate, Develop, Engage, Devolve |
| Communications/mass media campaigns; targeting opinion leaders, policy makers, mothers; simple and doable messages; celebrities | 8 | Innovate, Develop, Engage |
| Visible community events: world breastfeeding week, other | 3 | Innovate, Engage, Devolve |

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| Program delivery through other existing programs: immunizations, diarrheal control, family planning, and other programs | 6 | Innovate, Develop, Engage, Devolve |
| Workforce development | | |
| Training: administrators, health professionals, and paraprofessionals | 10 | Develop, Devolve |
| Endorsement from medical societies | 3 | Develop |
| Medical/nursing school curriculums | 3 | Develop |
| Legislation | | |
| Legislation: maternity leave, work place, WHO Code | 6 | Develop, Devolve |
| Program coordination and quality control | | |
| Intersectoral coordination: government, civil society (NGOs, philanthropists), medical societies, academic researchers, mass media | 8 | Develop, Engage, Devolve |
| Monitoring and evaluation; low-cost; rapid response | 6 | Assess, Devolve |

Table A4. Barriers to the dissemination, diffusion, scale up, and sustainability of exclusive breastfeeding by AIDED model components

| Barrier | # sources citing factor | AIDED model component(s) mapped to factor |
|--|-------------------------|---|
| Unethical marketing of infant formula | 7 | Develop, Engage, Devolve |
| Maternal employment | 2 | Engage |
| Unsustainable workforce development system (affects sustainability) | 3 | Devolve |
| Overburdened staff in medical facilities & in community health settings | 1 | Devolve |
| CHW investment just to promote BF difficult to justify | 5 | Develop, Devolve |
| Strong dependency on international aid (affects sustainability) | 3 | Devolve |
| Weak M&E systems | 3 | Assess, Develop, Devolve |
| Prolonged lag time before impacts can be detected | 1 | Devolve |
| Lack of community-level BF promotion and support | 3 | Develop, Engage, Devolve |
| Unpaid "volunteers" high turnover | 3 | Develop, Devolve |
| Cultural beliefs: "insufficient" milk, other | 5 | Innovate, Engage |
| Lack of multilevel incentives | 1 | Assess, Devolve |
| Program "fatigue" | 2 | Devolve |
| Lack of referral system for lactation management problems | 1 | Engage |
| Poor interpersonal communication skills among peer counselors/community health workers | 2 | Assess, Develop, Engage |

Table A5. Enabling factors for the dissemination, diffusion, scale up, and sustainability of community health workers (CHW) by AIDED model components

| Enabling factor | # sources citing factor | AIDED model component(s) mapped to factor |
|---|-------------------------|---|
| CHWs were recruited from and/or by the community | 11 | Innovate; Engage |
| Consistent management and supervision of CHWs and CHW program | 10 | Innovate |
| Ministry of Health or other government support, as reflected in financial support and rewards for CHWs, advocacy for CHWs, or initiation of CHW program | 9 | Develop |
| Integration/cooperation with broader health system/existing health care providers | 9 | Innovate; Develop |
| Respected and motivated people were selected as CHWs | 8 | Innovate; Engage |
| CHW approach was aligned with religious, moral, or ideological norms of social service | 8 | Assess; Innovate; Engage |
| Pay, stipend, or transportation support provided | 7 | Innovate |
| Strong community partnership/support/champions, including cooperation of CHW program with existing community organizations | 6 | Innovate |
| Tasks of CHW viewed as valuable and focused by community | 6 | Innovate; Engage |
| Gender/female involvement | 5 | Innovate |
| Intensive training (some sources specify ongoing or interval training) | 5 | Innovate |
| CHW position was viewed as path to a job later | 4 | Innovate; Engage |
| Regular monitoring and feedback; evaluation data used | 3 | Innovate |
| Assessment of/adaptation to community needs | 3 | Assess; Innovate; Engage |
| Effective supply chain | 3 | Innovate |
| Sufficient funding available for CHW program (specific funding mechanisms for CHW program established) | 2 | Develop |
| CHWs were given preferential treatment/access to other health and development services (e.g., micro-credit, appointments at health clinic) | 2 | Innovate; Develop |
| CHWs work in teams/networks | 2 | Innovate |

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| Narrowly focused set of tasks/role (disease-specific) | 2 | Innovate |
| Program targeted to communities with favorable characteristics (e.g., educated residents but limited employment options, commitment to improving own health) | 2 | Assess; Innovate; Engage |
| Children or family members of CHWs assumed CHW role when CHW retired | 1 | Devolve |
| CHW role is well defined and clear to CHW, community, and health system | 1 | Innovate; Develop; Engage |
| CHW training involves community and/or health facility field experience | 1 | Innovate; Engage |
| CHWs coordinated their activities with non-health sector development programs | 1 | Develop |
| Co-financing of CHW program by multiple levels of government (e.g., central, state, and municipal) | 1 | Develop |
| Design of CHW incentives based on behavioral science models | 1 | Innovate |
| Nonmonetary incentives provided (e.g., food or household goods, certificates, identification badges, job aids) | 1 | Innovate |
| Flexible schedule for fulfilling CHW role | 1 | Innovate |
| Charismatic initial leader of CHW program | 1 | Innovate |

Table A6. Barriers to the dissemination, diffusion, scale up, and sustainability of community health workers by AIDED model components

| Barrier | # sources citing factor | AIDED model components mapped to factor |
|---|-------------------------|---|
| Not enough pay or incentive for CHWs; CHWs wanted other employment, found other employment that paid more, or had other employment/work that competed with CHW role | 12 | Assess; Innovate |
| Weak or inconsistent management and supervision of CHWs and CHW program | 9 | Innovate |
| Lack of community support or lack of perceived value of CHW | 8 | Innovate; Engage |
| CHW was not respected or not integrated in hierarchy of health system | 7 | Innovate; Develop |
| Poor training of CHWs | 6 | Innovate |
| Lack of supplies needed by CHWs | 5 | Innovate |
| Unpredictability or reduction of donor funding for CHW program | 4 | Develop |
| Provider resistance to CHW role | 4 | Develop |
| Lack of or reduction in support from Ministry of Health, competition from other health programs | 4 | Develop |
| Distance between houses/work sites | 3 | Innovate |
| Lack of support from family members/spouses for CHWs' role | 2 | Assess; Engage |
| Stress/low morale among CHWs; CHWs feel overwhelmed by assigned tasks | 2 | Innovate |
| Inconsistent payment of monetary incentives (e.g., payment did not come on time or in promised amount) | 2 | Innovate |
| CHW health messages conflicted with community values/beliefs | 2 | Assess; Innovate; Engage |
| Lack of fidelity to recommended disease diagnosis and treatment practices | 2 | Innovate |
| Community views CHW as government employee rather than community volunteer | 2 | Engage |
| Inequitable distribution of incentives among different types of CHWs (e.g., some categories paid, others unpaid) | 1 | Assess; Innovate; Develop |
| Social norms around gender roles/ resistance to women | 1 | Assess; Engage |

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| working as CHWs | | |
| Community mistrust of external NGO sponsoring CHW program | 1 | Engage |
| Competition from private sector drug vendors | 1 | Develop |
| Failure to secure local government support for CHW program | 1 | Develop |
| Political upheaval | 1 | Develop |

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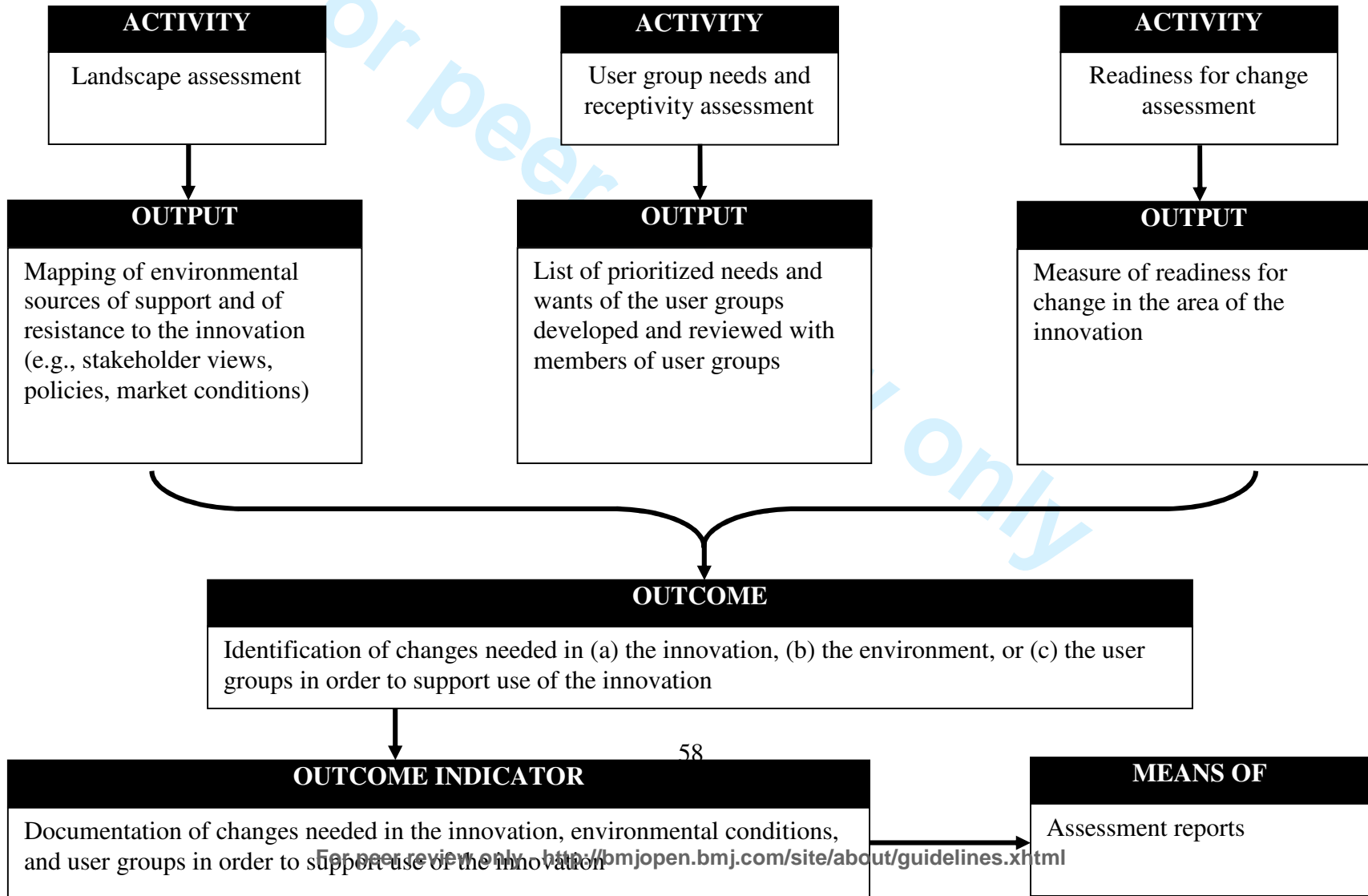
Table A7. Enabling factors for dissemination, diffusion, and scale up, and sustainability of social marketing by AIDED model components (n=17)

| Enabling Factor | # sources citing factor | AIDED model component(s) mapped to factor |
|---|-------------------------|---|
| Comprehensive formative research to enable market segmentation, tailored messaging and delivery strategies | 5 | Assess, Innovate |
| Professional standards/training for social marketing practitioners | 1 | Engage |
| Use of indigenous institutions (e.g. local authorities) and people in program planning, operation and evaluation | 6 | Innovate, Engage, Devolve |
| Government support (economic, regulatory) | 2 | Develop |
| Public-private partnerships | 7 | Innovate, Develop, Engage, Devolve |
| Purposeful engagement at all levels with the various stakeholders identified as essential to social marketing's success | 1 | Engage |

Table A8. Barriers to the dissemination, diffusion, scale up, and sustainability of social marketing by AIDED model components (n = 17)

| Barrier | # sources citing barrier | AIDED model component(s) mapped to factor |
|---|--------------------------|---|
| Lack of community participation/top-down strategies | 3 | Innovate, Engage |
| Weak commercial infrastructure | 1 | Devolve |
| Lack of formative research to understand social/cultural norms, preferences and concerns of target user group | 1 | Assess, Innovate |
| Insufficient attention to social determinants of health | 3 | Innovate |
| Inadequate documentation of lessons learned and success stories of social marketing | 3 | Develop |
| Limited evidence of cost-effectiveness | 4 | Develop |
| Perception of social marketing as poorly defined or insufficiently rigorous field | 2 | Develop, Engage |
| Competition from public sector and subsidized programs | 1 | Develop, Devolve |

Figure A1. Assess component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement



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Figure A2. Innovate component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement

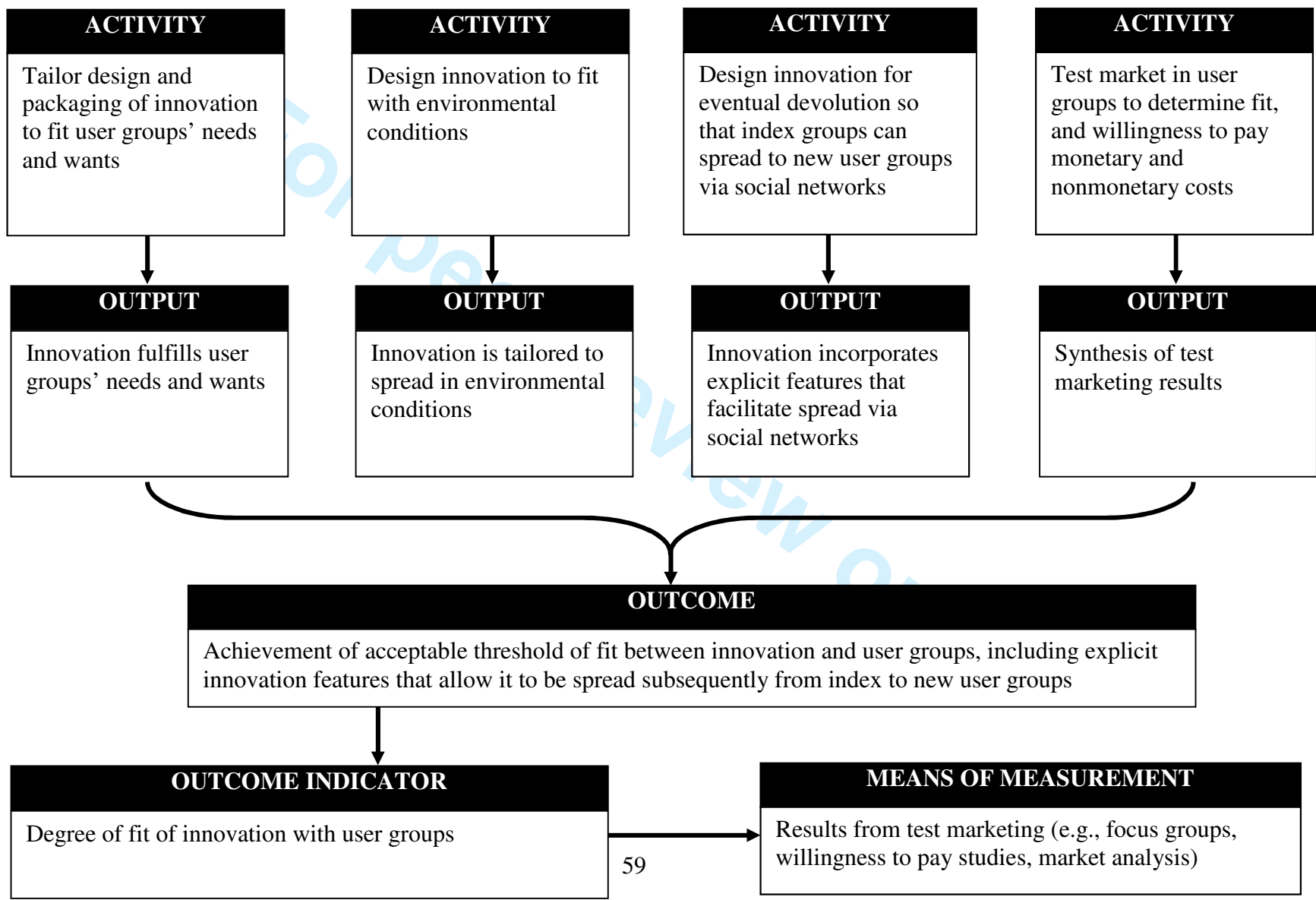


Figure A3. Develop component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement

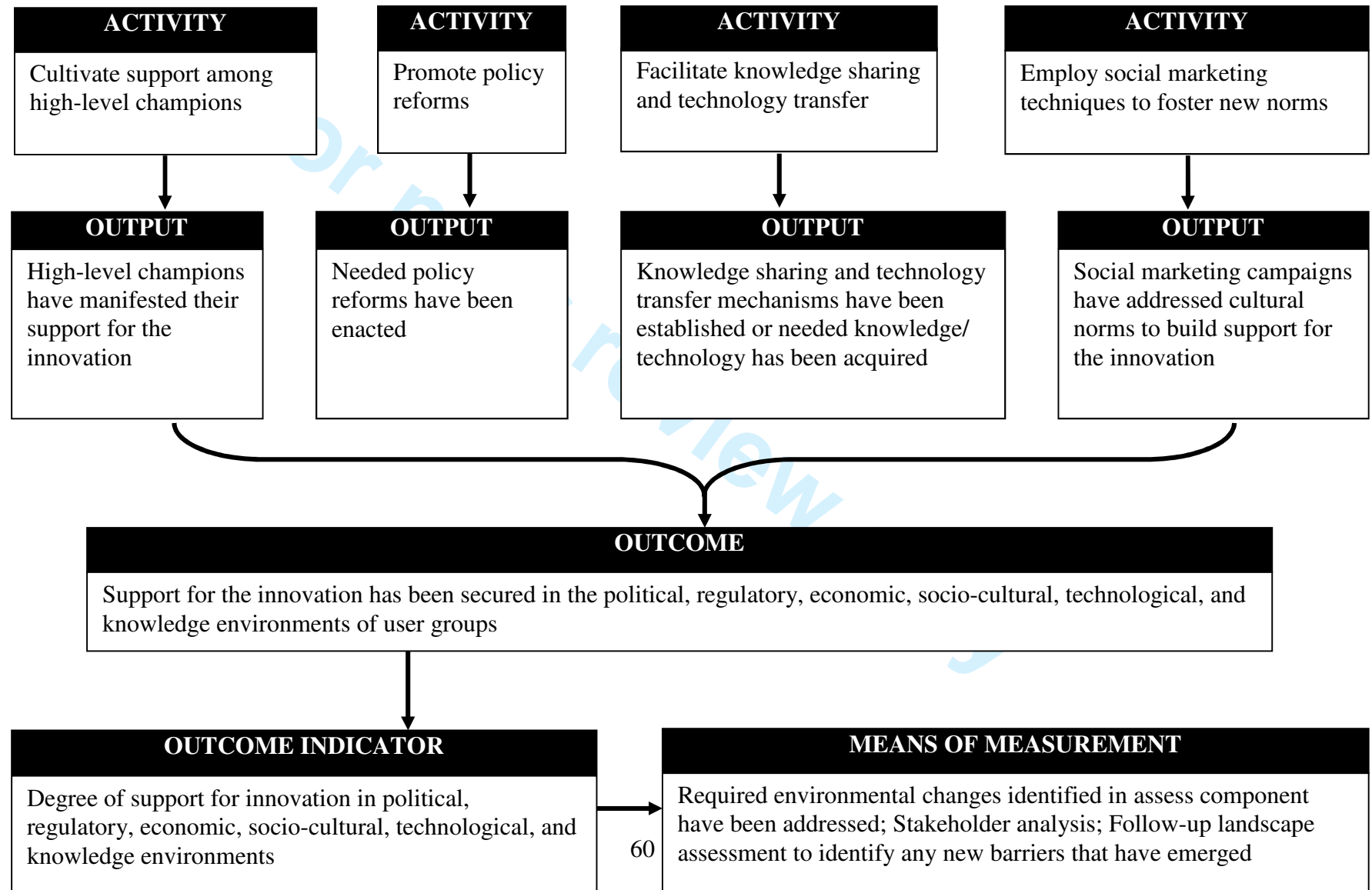


Figure A4. Engage component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement

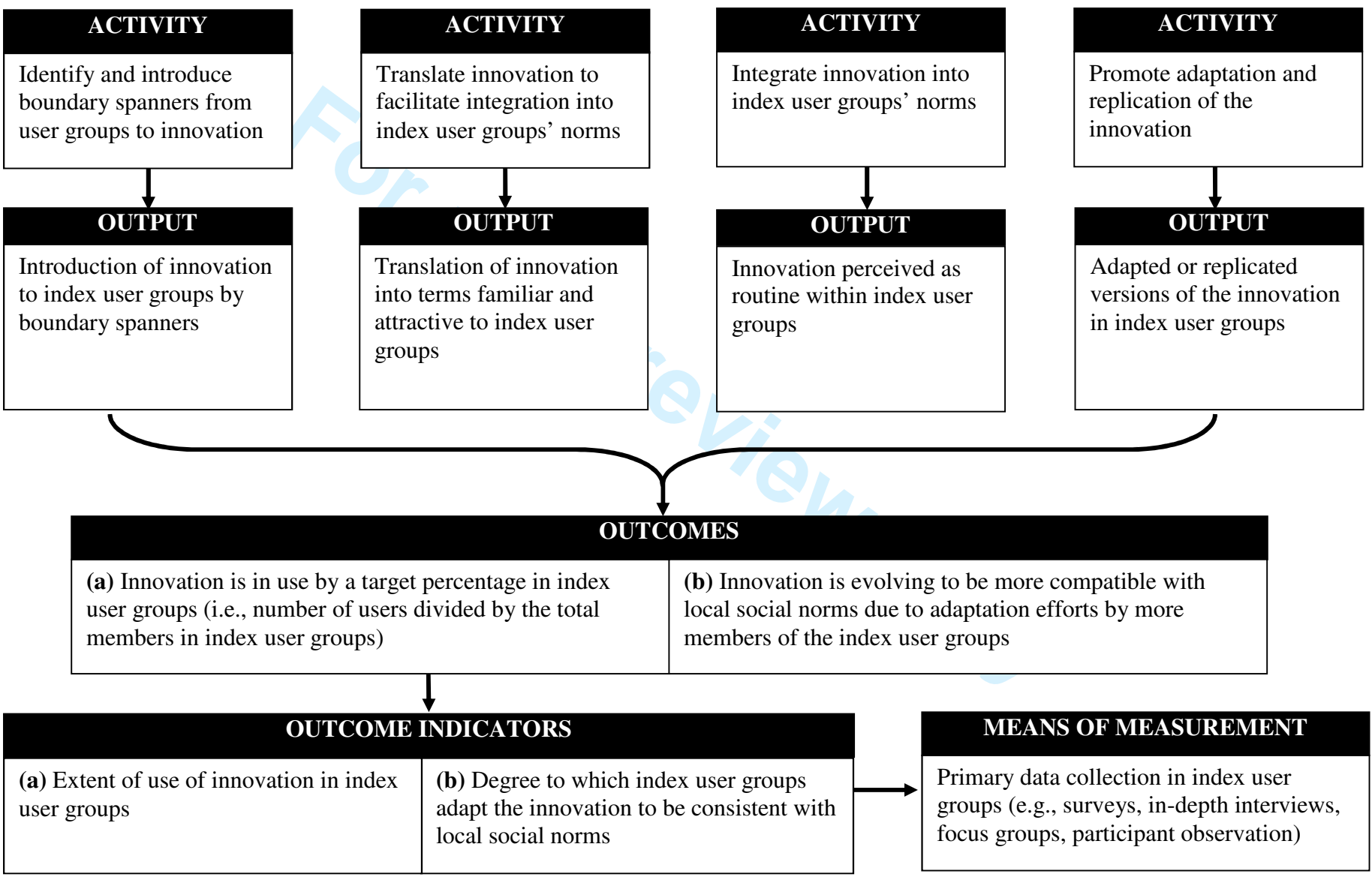
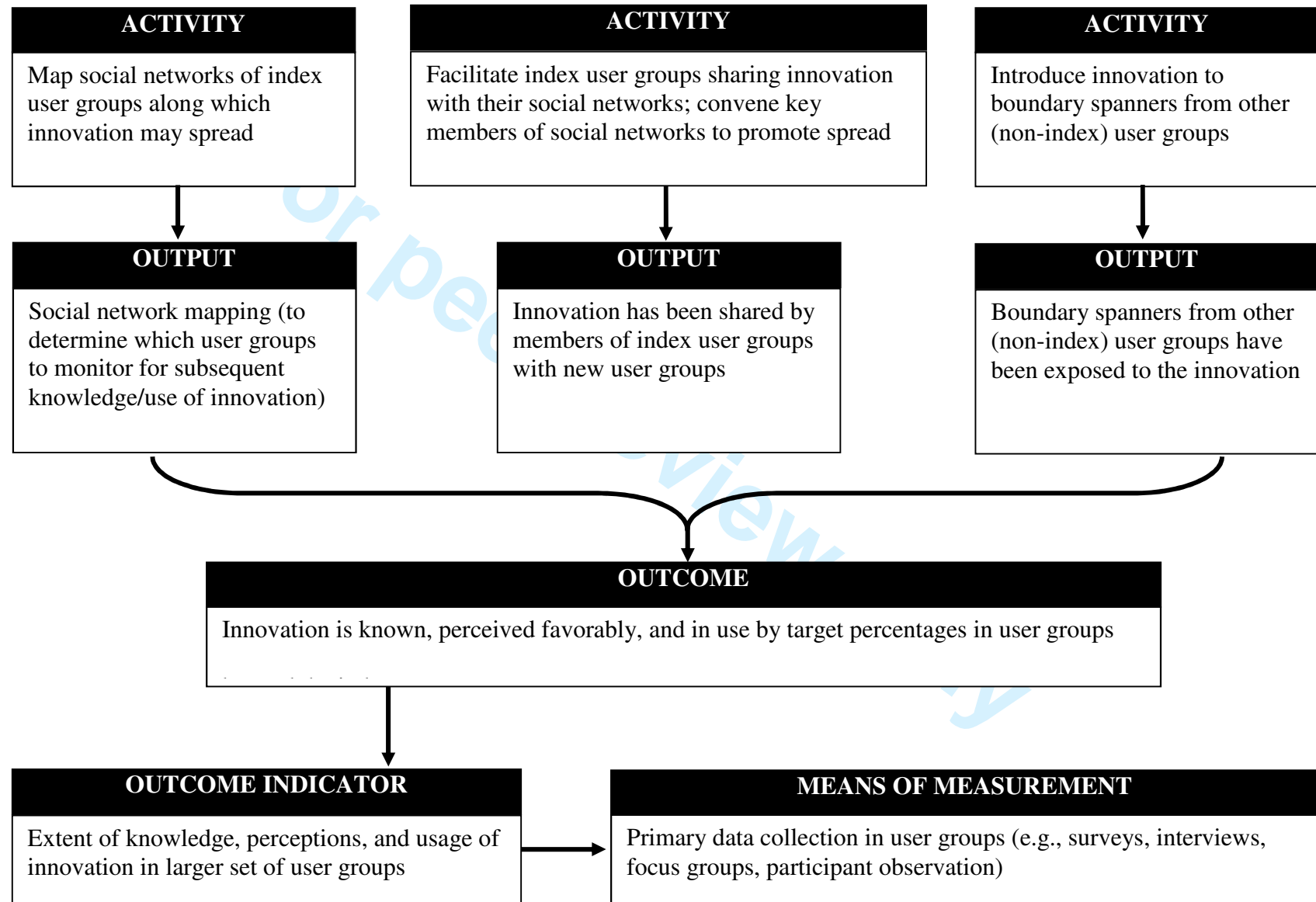


Figure A5. Devolve component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement



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APPENDIX

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Table A1. Enabling factors for the dissemination, diffusion, scale up, and sustainability of Depo-Provera by AIDED model components

| Enabling factor | # sources citing factor | AIDED model component(s) mapped to factor |
|--|-------------------------|---|
| Development of delivery system supports (training of health workers/field motivators, creation of training manuals or checklists, supply chain improvements, recruitment of women, chart tracking) | 9 | Develop |
| Tailoring innovation to existing system capacity (CBD systems already in place, women in CHW roles, other existing program infrastructure (ie. Well baby clinics), current supply chain flows) - | 8 | Innovate |
| Landscape or stakeholder assessment | 6 | Assess |
| Use of social networks | 5 | Devolve |
| Collaboration with stakeholders to identify or creating supportive structures in the economic, political and technological spheres | 5 | Assess, Develop |
| Dialogue with community at early stages | 5 | Assess, Engage |
| Effective education through social marketing re: risks and instructions (including community input) | 4 | Develop, Engage |
| Piloting to determine feasibility | 3 | Assess |
| Innovation design features (injectable at 3 month intervals) | 3 | Innovate |
| Ensuring 'fit' with cultural norms (can take in secret) | 3 | Assess, Innovate |
| Use of data to improve program performance | 3 | Engage |
| Nationalistic messaging (population control, etc.) | 2 | Develop |
| Adherence to religious norms (support of leaders) | 1 | Innovate, Develop, Engage |
| Identifying potential sources of resistance, such as from the professional medical community | 1 | Assess |
| Creating structures to ensure use of assessment findings through implementation and scale up (e.g., the same individuals that conducted the assessment remained involved through the process of scaling) | 1 | Assess |

Table A2. Barriers to the dissemination, diffusion, scale up, and sustainability of Depo-Provera by AIDED model components

| Barrier | # sources citing factor | AIDED model component(s) mapped to factor |
|---|-------------------------|---|
| Lack of system capacity (delivery/administrative challenges, lack of equipment, supply chain stockouts due to mismanagement, staff burden) | 5 | Innovate, Develop |
| Rural nature of program areas (made supply chain and human resource chain difficult to maintain) | 5 | Devolve |
| Inadequate resources for scaled-up activities (declined as expansion proceeded) | 4 | Devolve |
| Competing alternatives (in family planning product; eg. other brand names, delivery sector; eg. public vs private) | 3 | Develop |
| Misaligned government policies and priorities (favored HIV/AIDS projects, within FP, emphasized long acting methods, favored provision of FP through medical personnel) | 3 | Assess, Develop, Devolve |
| Data collection challenges (contact between front line and supervisors too rare, front line not understanding tools, follow-up challenges etc.) | 3 | Develop |
| Social/cultural norms (male dominance/power concerns about fidelity and family size; mothers in law) | 1 | Assess, Innovate, Engage, |
| Lack of knowledge/awareness (inadequate counseling/patient education/lack of patient centered care, information sharing) | 1 | Develop, Engage |
| Opposition by medical professionals | 1 | Assess, Engage |
| Lack of ongoing stakeholder support (key leaders left after pilot phase) | 1 | Devolve |

Table A3. Enabling factors for the dissemination, diffusion, scale up, and sustainability of exclusive breastfeeding by AIDED model components

| Enabling Factor | # sources citing factor | AIDED model components mapped to factor |
|--|-------------------------|---|
| <u>Contextual</u> | | |
| International advocacy groups: IBFAN, WABA | 5 | Develop |
| Evidence-based recommendations: timely initiation of BF; EBF for 6 months (WHO) | 5 | Develop |
| International consensus meetings/declarations: Bellagio and beyond | 8 | Develop |
| <u>Political support</u> | | |
| Cost/savings analyses | 6 | Assess |
| Local advocacy & coalition building, including public opinion leaders | 8 | Develop |
| Civil society mobilization & engagement | 6 | Develop |
| Political sensitization | 6 | Develop |
| Political will | 6 | Develop |
| Long term commitment to scaling-up | 9 | Devolve |
| <u>Process and sustainability facilitators</u> | | |
| Research and evaluation | | |
| Baseline facility and community needs assessments | 7 | Assess |
| Operational (formative) research/pilot studies | 8 | Assess |
| Program delivery | | |
| Facility-based delivery system: e.g., BFHI | 8 | Innovate, Develop, Engage, Devolve |
| Community-based EBF promotion & support: baby friendly primary health care units, peer counselors, community health workers, mother-to-mother support groups | 8 | Innovate, Develop, Engage, Devolve |
| Communications/mass media campaigns; targeting opinion leaders, policy makers, mothers; simple and doable messages; celebrities | 8 | Innovate, Develop, Engage |
| Visible community events: world breastfeeding week, other | 3 | Innovate, Engage, Devolve |
| Program delivery through other existing programs: immunizations, diarrheal control, | 6 | Innovate, Develop, Engage, Devolve |

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|--|----|--------------------------|
| family planning, and other programs | | |
| Workforce development | | |
| Training: administrators, health professionals, and paraprofessionals | 10 | Develop, Devolve |
| Endorsement from medical societies | 3 | Develop |
| Medical/nursing school curriculums | 3 | Develop |
| Legislation | | |
| Legislation: maternity leave, work place, WHO Code | 6 | Develop, Devolve |
| Program coordination and quality control | | |
| Intersectoral coordination: government, civil society (NGOs, philanthropists), medical societies, academic researchers, mass media | 8 | Develop, Engage, Devolve |
| Monitoring and evaluation; low-cost; rapid response | 6 | Assess, Devolve |

Table A4. Barriers to the dissemination, diffusion, scale up, and sustainability of exclusive breastfeeding by AIDED model components

| Barrier | # sources citing factor | AIDED model component(s) mapped to factor |
|--|-------------------------|---|
| Unethical marketing of infant formula | 7 | Develop, Engage, Devolve |
| Maternal employment | 2 | Engage |
| Unsustainable workforce development system (affects sustainability) | 3 | Devolve |
| Overburdened staff in medical facilities & in community health settings | 1 | Devolve |
| CHW investment just to promote BF difficult to justify | 5 | Develop, Devolve |
| Strong dependency on international aid (affects sustainability) | 3 | Devolve |
| Weak M&E systems | 3 | Assess, Develop, Devolve |
| Prolonged lag time before impacts can be detected | 1 | Devolve |
| Lack of community-level BF promotion and support | 3 | Develop, Engage, Devolve |
| Unpaid "volunteers" high turnover | 3 | Develop, Devolve |
| Cultural beliefs: "insufficient" milk, other | 5 | Innovate, Engage |
| Lack of multilevel incentives | 1 | Assess, Devolve |
| Program "fatigue" | 2 | Devolve |
| Lack of referral system for lactation management problems | 1 | Engage |
| Poor interpersonal communication skills among peer counselors/community health workers | 2 | Assess, Develop, Engage |

Table A5. Enabling factors for the dissemination, diffusion, scale up, and sustainability of community health workers (CHW) by AIDED model components

| Enabling factor | # sources citing factor | AIDED model component(s) mapped to factor |
|---|-------------------------|---|
| CHWs were recruited from and/or by the community | 11 | Innovate; Engage |
| Consistent management and supervision of CHWs and CHW program | 10 | Innovate |
| Ministry of Health or other government support, as reflected in financial support and rewards for CHWs, advocacy for CHWs, or initiation of CHW program | 9 | Develop |
| Integration/cooperation with broader health system/existing health care providers | 9 | Innovate; Develop |
| Respected and motivated people were selected as CHWs | 8 | Innovate; Engage |
| CHW approach was aligned with religious, moral, or ideological norms of social service | 8 | Assess; Innovate; Engage |
| Pay, stipend, or transportation support provided | 7 | Innovate |
| Strong community partnership/support/champions, including cooperation of CHW program with existing community organizations | 6 | Innovate |
| Tasks of CHW viewed as valuable and focused by community | 6 | Innovate; Engage |
| Gender/female involvement | 5 | Innovate |
| Intensive training (some sources specify ongoing or interval training) | 5 | Innovate |
| CHW position was viewed as path to a job later | 4 | Innovate; Engage |
| Regular monitoring and feedback; evaluation data used | 3 | Innovate |
| Assessment of/adaptation to community needs | 3 | Assess; Innovate; Engage |
| Effective supply chain | 3 | Innovate |
| Sufficient funding available for CHW program (specific funding mechanisms for CHW program established) | 2 | Develop |
| CHWs were given preferential treatment/access to other health and development services (e.g., micro-credit, appointments at health clinic) | 2 | Innovate; Develop |
| CHWs work in teams/networks | 2 | Innovate |
| Narrowly focused set of tasks/role (disease-specific) | 2 | Innovate |

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| Program targeted to communities with favorable characteristics (e.g., educated residents but limited employment options, commitment to improving own health) | 2 | Assess; Innovate; Engage |
| Children or family members of CHWs assumed CHW role when CHW retired | 1 | Devolve |
| CHW role is well defined and clear to CHW, community, and health system | 1 | Innovate; Develop; Engage |
| CHW training involves community and/or health facility field experience | 1 | Innovate; Engage |
| CHWs coordinated their activities with non-health sector development programs | 1 | Develop |
| Co-financing of CHW program by multiple levels of government (e.g., central, state, and municipal) | 1 | Develop |
| Design of CHW incentives based on behavioral science models | 1 | Innovate |
| Nonmonetary incentives provided (e.g., food or household goods, certificates, identification badges, job aids) | 1 | Innovate |
| Flexible schedule for fulfilling CHW role | 1 | Innovate |
| Charismatic initial leader of CHW program | 1 | Innovate |

Table A6. Barriers to the dissemination, diffusion, scale up, and sustainability of community health workers by AIDED model components

| Barrier | # sources citing factor | AIDED model components mapped to factor |
|---|-------------------------|---|
| Not enough pay or incentive for CHWs; CHWs wanted other employment, found other employment that paid more, or had other employment/work that competed with CHW role | 12 | Assess; Innovate |
| Weak or inconsistent management and supervision of CHWs and CHW program | 9 | Innovate |
| Lack of community support or lack of perceived value of CHW | 8 | Innovate; Engage |
| CHW was not respected or not integrated in hierarchy of health system | 7 | Innovate; Develop |
| Poor training of CHWs | 6 | Innovate |
| Lack of supplies needed by CHWs | 5 | Innovate |
| Unpredictability or reduction of donor funding for CHW program | 4 | Develop |
| Provider resistance to CHW role | 4 | Develop |
| Lack of or reduction in support from Ministry of Health, competition from other health programs | 4 | Develop |
| Distance between houses/work sites | 3 | Innovate |
| Lack of support from family members/spouses for CHWs' role | 2 | Assess; Engage |
| Stress/low morale among CHWs; CHWs feel overwhelmed by assigned tasks | 2 | Innovate |
| Inconsistent payment of monetary incentives (e.g., payment did not come on time or in promised amount) | 2 | Innovate |
| CHW health messages conflicted with community values/beliefs | 2 | Assess; Innovate; Engage |
| Lack of fidelity to recommended disease diagnosis and treatment practices | 2 | Innovate |
| Community views CHW as government employee rather than community volunteer | 2 | Engage |
| Inequitable distribution of incentives among different types of CHWs (e.g., some categories paid, others unpaid) | 1 | Assess; Innovate; Develop |
| Social norms around gender roles/ resistance to women working as CHWs | 1 | Assess; Engage |

| | | |
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| Community mistrust of external NGO sponsoring CHW program | 1 | Engage |
| Competition from private sector drug vendors | 1 | Develop |
| Failure to secure local government support for CHW program | 1 | Develop |
| Political upheaval | 1 | Develop |

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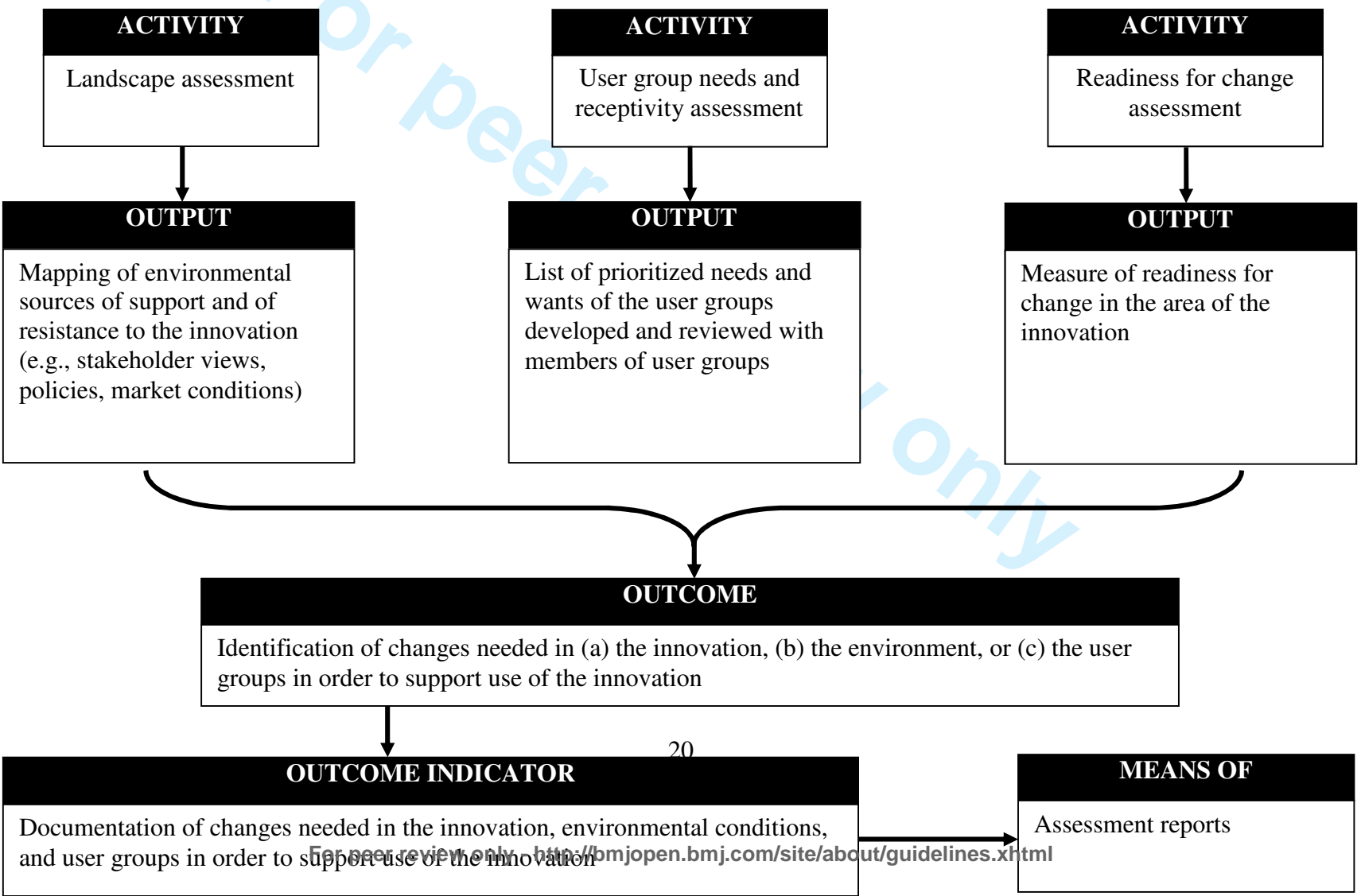
Table A7. Enabling factors for dissemination, diffusion, and scale up, and sustainability of social marketing by AIDED model components (n=17)

| Enabling Factor | # sources citing factor | AIDED model component(s) mapped to factor |
|---|-------------------------|---|
| Comprehensive formative research to enable market segmentation, tailored messaging and delivery strategies | 5 | Assess, Innovate |
| Professional standards/training for social marketing practitioners | 1 | Engage |
| Use of indigenous institutions (e.g. local authorities) and people in program planning, operation and evaluation | 6 | Innovate, Engage, Devolve |
| Government support (economic, regulatory) | 2 | Develop |
| Public-private partnerships | 7 | Innovate, Develop, Engage, Devolve |
| Purposeful engagement at all levels with the various stakeholders identified as essential to social marketing's success | 1 | Engage |

Table A8. Barriers to the dissemination, diffusion, scale up, and sustainability of social marketing by AIDED model components (n = 17)

| Barrier | # sources citing barrier | AIDED model component(s) mapped to factor |
|---|--------------------------|---|
| Lack of community participation/top-down strategies | 3 | Innovate, Engage |
| Weak commercial infrastructure | 1 | Devolve |
| Lack of formative research to understand social/cultural norms, preferences and concerns of target user group | 1 | Assess, Innovate |
| Insufficient attention to social determinants of health | 3 | Innovate |
| Inadequate documentation of lessons learned and success stories of social marketing | 3 | Develop |
| Limited evidence of cost-effectiveness | 4 | Develop |
| Perception of social marketing as poorly defined or insufficiently rigorous field | 2 | Develop, Engage |
| Competition from public sector and subsidized programs | 1 | Develop, Devolve |

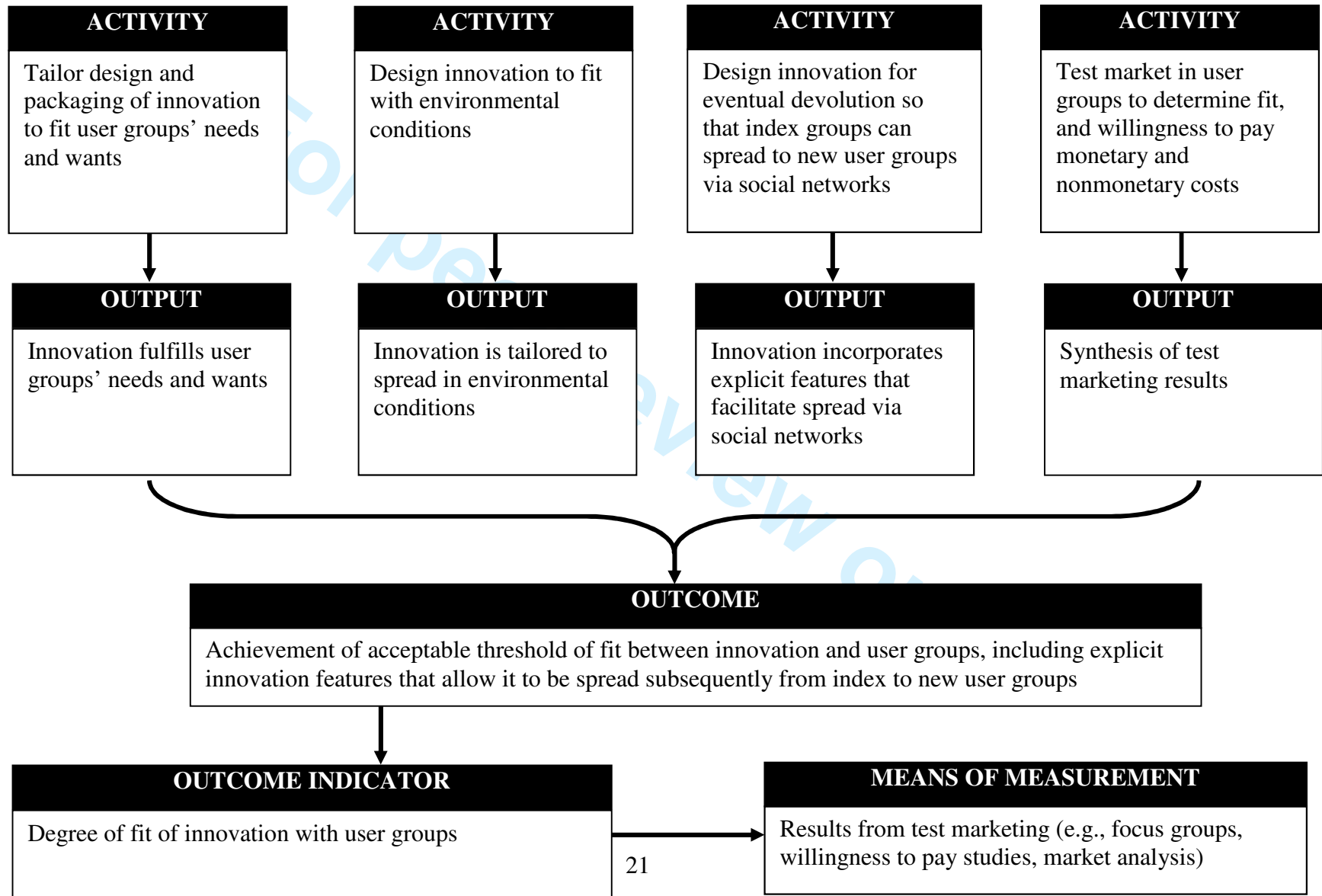
Figure A1. Assess component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement



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Figure A2. Innovate component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement



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Figure A3. Develop component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement

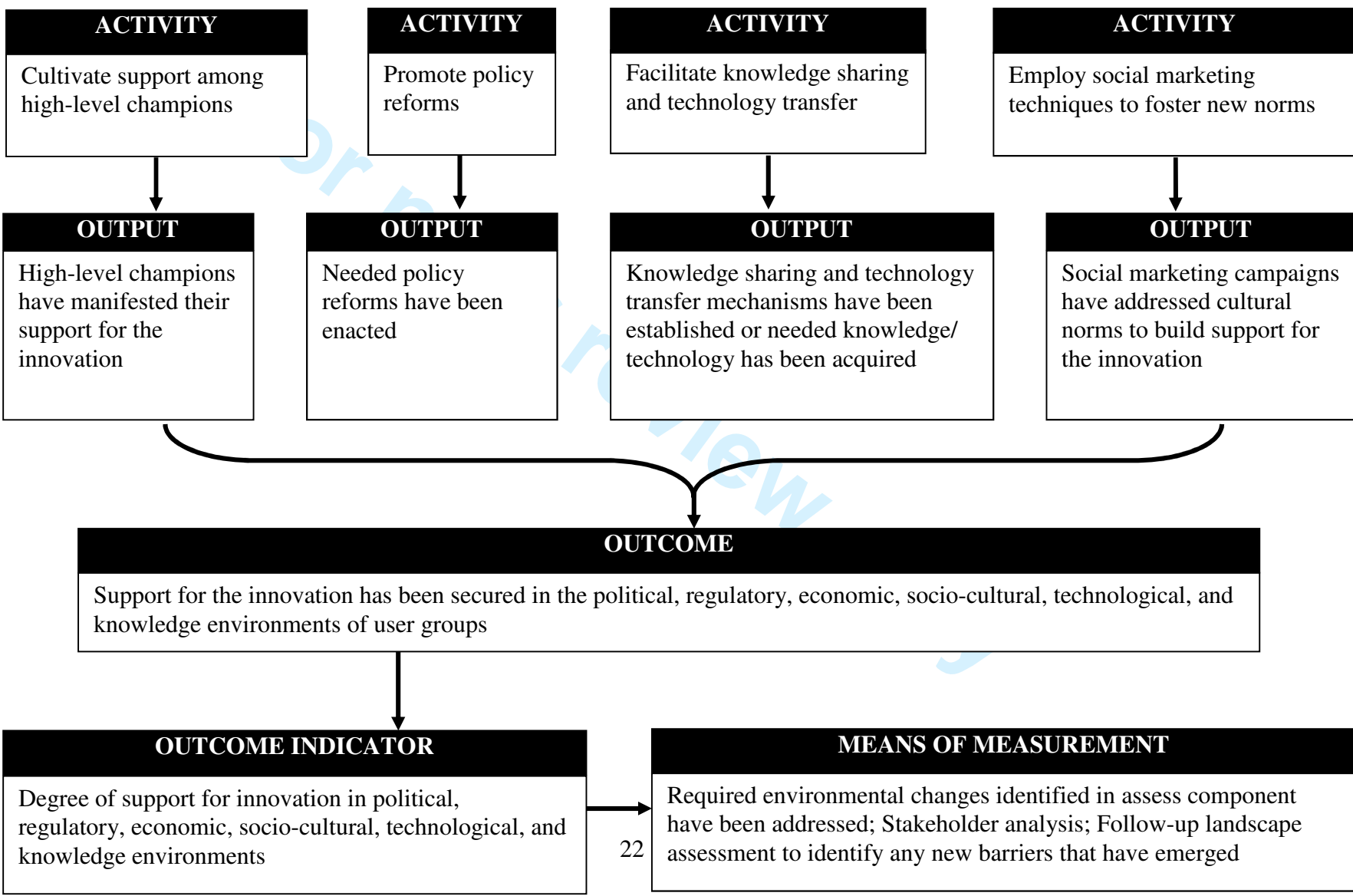
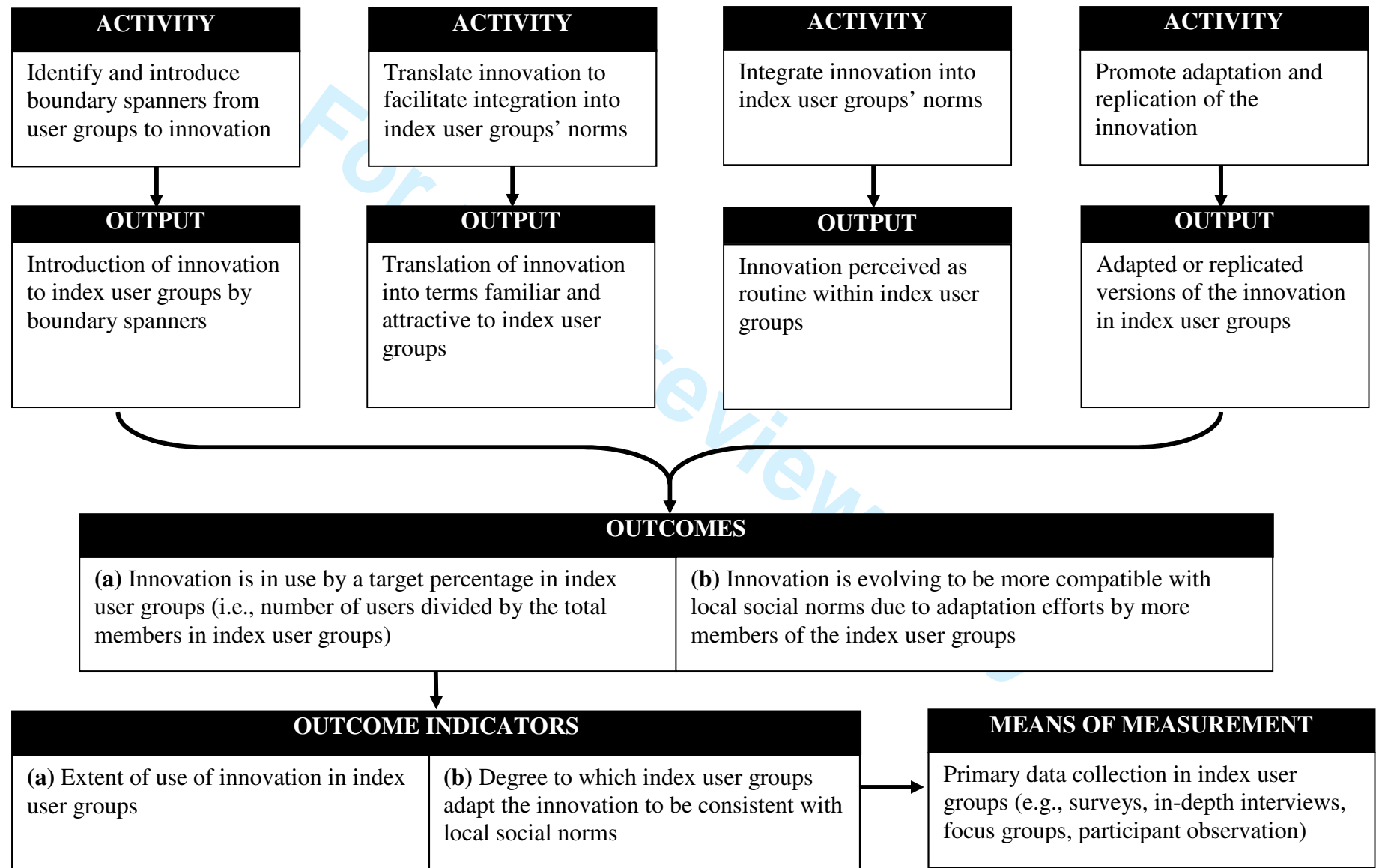
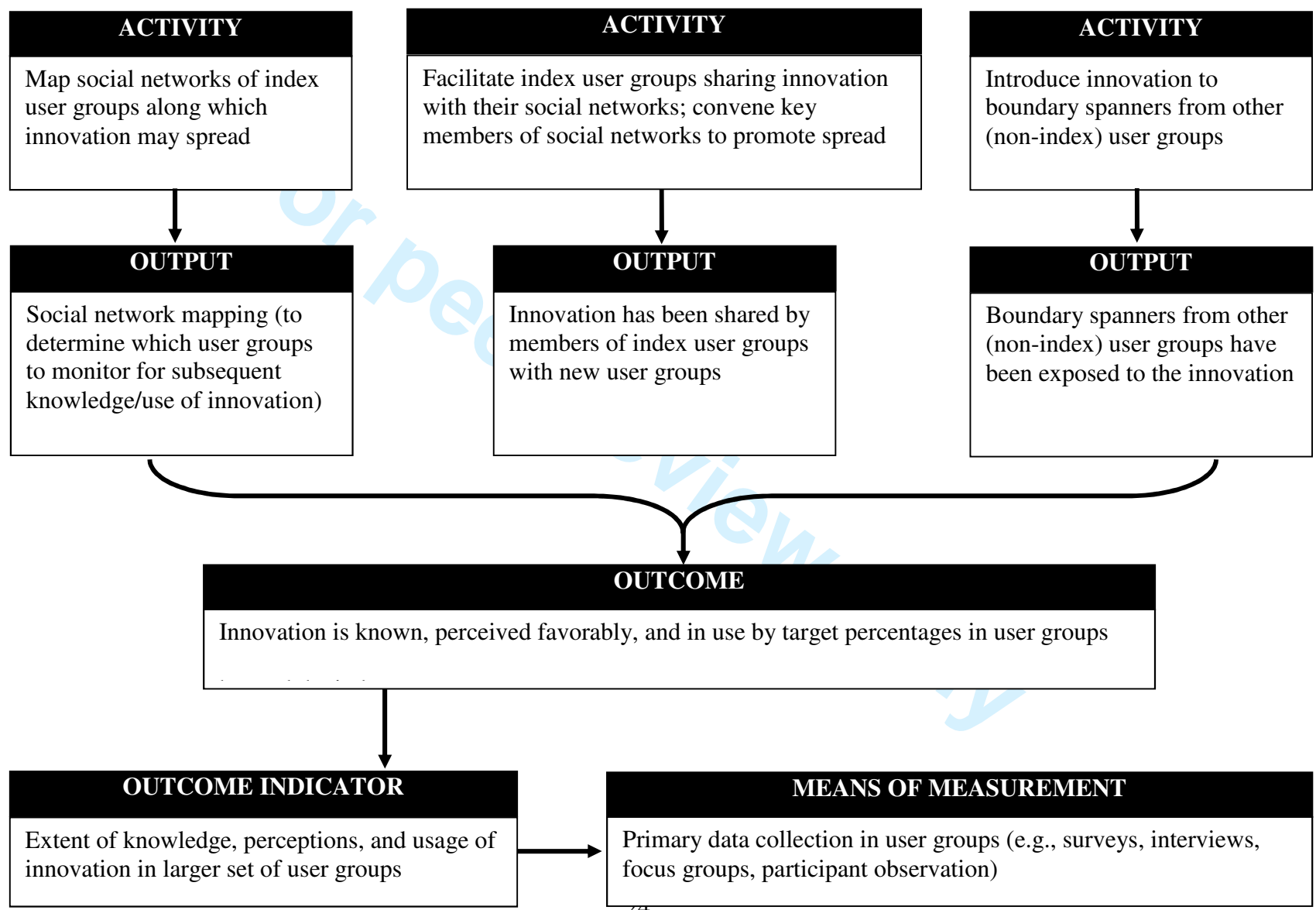


Figure A4. Engage component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement



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Figure A5. Devolve component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement



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For peer review only



**A MODEL FOR SCALE UP OF FAMILY HEALTH INNOVATIONS
IN LOW- AND MIDDLE-INCOME SETTINGS: A MIXED
METHODS STUDY**

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A MODEL FOR SCALE UP OF FAMILY HEALTH INNOVATIONS IN LOW- AND MIDDLE-INCOME SETTINGS: A MIXED METHODS STUDY

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AIDED model for scale up of family health innovations

Key words: scale up, family health, low-income settings, innovation, global health

Word Count: 5,635 (excluding 608-word abstract)

Abstract

Comment [YUN1]: Abstract revised in full

Background

Many family health innovations that have been shown to be both efficacious and cost-effective fail to scale up for widespread use particularly in low- and middle-income countries (LMIC).

Although individual cases of successful scale up, in which widespread take up occurs, have been described, we lack an integrated and practical model of scale up that may be applicable to a wide range of public health innovations in LMIC.

Objective

To develop an integrated and practical model of scale up that synthesizes experiences of family health programs in LMICs.

Data sources

We conducted a mixed methods study that included in-depth interviews with 33 key informants and a systematic review of peer-reviewed and gray literature from 11 electronic databases and 20 global health agency web sites.

Study eligibility criteria, participants, and interventions

We included key informants and studies that reported on the scale up of several family health innovations including Depo-Provera as an example of a product innovation, exclusive breastfeeding as an example of a health behaviour innovation, community health workers (CHWs) as an example of an organizational innovation, and social marketing as an example of a business model innovation. Key informants were drawn from non-governmental, government, and international organizations using snowball sampling. An article was excluded if the article:

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did not meet the study's definition of the innovation, did not address dissemination, diffusion, scale up, or sustainability of the innovation, did not address low- or middle-income countries, was superficial in its discussion and/or did not provide empirical evidence about scale up of the innovation, was not available online in full text, or was not available in English, French, Spanish, or Portuguese, resulting in a final sample of 41 peer-reviewed articles and 30 gray literature sources.

Study appraisal and synthesis methods

We used the constant comparative method of qualitative data analysis to extract recurrent themes from the interviews, and we integrated these themes with findings from the literature review to generate the proposed model of scale up. For the systematic review, screening was conducted independently by two team members to ensure consistent application of the predetermined exclusion criteria. Data extraction from the final sample of peer-reviewed and gray literature was conducted independently by two team members using a pre-established data extraction form to list the enabling factors and barriers to dissemination, diffusion, scale up, and sustainability.

Results

The resulting model – the AIDED model – included 5 non-linear, interrelated components: 1) assess the landscape, 2) innovate to fit user receptivity, 3) develop support, 4) engage user groups, and 5) devolve efforts for spreading innovation. Our findings suggest that successful scale up occurs within a complex adaptive system, characterized by interdependent parts, multiple feedback loops, and several potential paths to achieve intended outcomes. Failure to

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9 scale up may be attributable to insufficient assessment of user groups in context, lack of fit of
10 the innovation with user receptivity, inability to address resistance from stakeholders, and
11 inadequate engagement with user groups.
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13 **Limitations**

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16 The inductive approach used to construct the AIDED model did not allow for simultaneous
17 empirical testing of the model. Furthermore, the literature may have publication bias in which
18 negative studies are underrepresented, although we did find examples of unsuccessful scale up.
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20 Last, the AIDED model did not address long term, sustained use of innovations that are
21 successfully scaled up, which would require longer-term follow up than is common in the
22 literature.
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29 **Conclusions and Implications of Key Findings**

30 Flexible strategies of assessment, innovation, development, engagement, and devolution are
31 required to enable effective change in the use of family health innovations in LMIC.
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34 **Funding**

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40 All authors have completed the Unified Competing Interest form at
41 http://www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author)
42
43 and declare: no support from any organisation for the submitted work; no financial
44
45 relationships with any organisations that might have an interest in the submitted work in the
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previous three years, no other relationships or activities that could appear to have influenced the submitted work.

Introduction

Many family health innovations that have been shown to be both efficacious and cost-effective fail to scale up for widespread use particularly in low- and middle-income countries (LMIC). As of 2008, only 45% of married women in LMIC were using modern contraception and only 5% were using injectables (1), rates of exclusive breastfeeding for the first 6 months of life are reportedly at about 38% in LMIC (2), and much of Africa lacks potentially beneficial community health worker programs (3). Such limited use of these family health efforts persists despite ample evidence of their health benefits and cost-effectiveness.

Although individual case studies of successful scale up have been documented, we lack an integrated, practical model that synthesizes scale up experiences of family health programs in LMIC. Existing frameworks have identified factors that may influence scale up (4-7), including features of the innovation, the potential adopters, and the environment in which scale up occurs. Nevertheless, these broad domains provide limited guidance on the mechanisms of scale up, which are essential for guiding effective scale up efforts in family health.

Accordingly, we sought to synthesize the evidence from key informant experiences as well as peer-reviewed and gray literature to produce a practical model of scale up. For the purposes of our analysis, we refer to innovation as the use of products, practices, or approaches that, for the user, are new. We used Depo-Provera as an example of a product innovation, exclusive breastfeeding as an example of a health behaviour innovation, community health workers (CHWs) as an example of an organizational innovation, and social marketing as an example of

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9 business model innovation. Although these interventions have existed in some communities for
10 decades, we consider them innovations in contexts and communities where they have not been
11 used previously and are therefore new. These sample innovations provided lenses through which to
12 examine scale up processes in family health in LMIC.
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15 16 **Methods**

17 *Study design and sample*

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19 We conducted a mixed methods study that included in-depth interviews and a
20 systematic review of peer-reviewed and gray literature. We chose to include a qualitative
21 approach because this method is well suited for studying complex and nuanced social processes
22 (8, 9) and for generating novel insights (8, 10, 11) through the use of inductive approaches.
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28 *In-depth interviews*

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30 We conducted in-depth interviews with 33 key informants who had a broad range of
31 experiences with scale up of the selected family health innovations in LMIC. As appropriate for
32 theory development, we used purposeful sampling in which one seeks key informants who
33 have knowledge about and will discuss the phenomenon of inquiry (8). We therefore sought
34 informants with expertise in the different innovation types (Depo-Provera, breastfeeding,
35 community health workers, and social marketing), with experience at different levels (front-line
36 implementation, policy formulation, funding), in different geographical regions (sub-Saharan
37 Africa, Middle East, Latin America, and South Asia), and working in different types of
38 organizations and agencies (government, non-governmental organizations and foundations,
39 United Nations, private sector, and universities). We developed the purposeful sample based
40 on relevant peer-reviewed or gray literature, our team's professional networks, and the Bill &
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9 Melinda Gates Foundation (BMGF) staff, who had launched major initiatives in family health.
10 We then employed snowball sampling (8) to enroll additional interviewees until we achieved
11 theoretical saturation (8, 11), i.e., until successive interviews produced no new concepts, which
12 occurred with 33 interviews. Ultimately, 15 of the 33 people interviewed had associations with
13 the BMGF, although these individuals represented diverse professional backgrounds and
14 relayed experiences that preceded their current role at the BMGF. Interviews were conducted
15 by research team members experienced in qualitative interviewing; two researchers with
16 complementary backgrounds conducted each interview using a standard interview guide
17 (Figure 1) either in person or via telephone. The study was reviewed by the Yale Human
18 Subjects Committee (IRB # 00000594) and granted an exemption under 45 CFR 46.101(b)(2).
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29 We used the constant comparison method (8, 11) to classify key concepts, expanding
30 and refining properties of the codes with review of successive transcripts. We reconciled
31 differences in coding through consensus and finalized a comprehensive code structure, which
32 was systematically applied to all transcripts. We used ATLAS.ti Scientific Software, version 6.1,
33 to facilitate organization, analysis, and retrieval of data.
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39 To improve the trustworthiness and reliability of the findings, we employed several
40 methods recommended by experts in qualitative research (8). These included tape-recording
41 interviews after consent, using a team of 5 data coders and analysts who reflected different
42 disciplines, and retaining an audit trail of methods and coding decisions throughout the
43 analysis. For a subset of key informants, we used participant confirmation (8, 12) and
44 incorporated their additional insights from review of the initial findings. Additionally, after the
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9 interview and literature review data were synthesized, we conducted respondent validation
10 (13). In this process, findings from the in-depth interviews and literature synthesis were shared
11 with study participants to provide feedback; these reactions were addressed and accounted for
12 in the analysis.
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15 *Literature review*

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17 We conducted a systematic review of peer-reviewed and gray literature for each of the
18 selected innovations. We included studies conducted in middle-income countries in the review
19 because many countries that are today middle income (e.g., India, Brazil) were low income in
20 the past. For each innovation, we searched for peer-reviewed literature in 11 electronic
21 databases (MEDLINE, CINAHL, EMBASE, Web of Knowledge, PsycINFO, Global Health, EconLit,
22 Social Sciences Citation Index, International Bibliography of Social Sciences, Social Services
23 Abstracts, and Sociological Abstracts), including any literature published since the earliest date
24 indexed in each database up to 2010. In addition, we searched the websites of 20 leading
25 global health donors, implementers, and technical agencies to identify relevant gray literature
26 (WHO, UNICEF, UNDP, UNFPA, the World Bank, the African Development Bank, the Inter-
27 American Development Bank, the Asian Development Bank, USAID, CIDA, DFID, SIDA, GTZ, the
28 Global Fund to Fight AIDS, Tuberculosis and Malaria, CARE, GAIN, Family Health International,
29 Partners in Health, Management Sciences for Health, and John Snow, Inc.). All searches used a
30 standard set of search terms related to dissemination, diffusion, scale up and sustainability and
31 a tailored set of search terms specific to the innovation.
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For the peer-reviewed literature, we screened the abstracts of all search results and screened the full text of those articles retained following abstract screening. Screening was conducted independently by two team members to ensure consistent application of the predetermined exclusion criteria. An article was excluded if it did not meet the study's definition of the innovation, if it did not address dissemination, diffusion, scale up, or sustainability of the innovation, if it did not address low- or middle-income countries, if it was superficial in its discussion and/or did not provide empirical evidence about scale up of the innovation, if the full text of the article was not available online, or if the article was not available in English, French, Spanish, or Portuguese.

Gray literature searches included any documents available via the organization's web site on the February 2011 search dates. Due to the large volume of hits generated from these Web site searches, the titles of all hits were screened first. If a document appeared relevant on the basis of its title, the full text was reviewed using the same exclusion criteria as applied to the peer-reviewed literature.

Data extraction from the final sample of peer-reviewed and gray literature was conducted independently by two research team members using a pre-established data extraction form. The extraction form was used to list the enabling factors and barriers to dissemination, diffusion, scale up, and sustainability. [Disagreements that occurred during the review in application of the exclusion criteria or in data extraction were resolved through negotiated consensus among the researchers conducting the review.](#)

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9 The resulting enabling factors and barriers found in the literature for each innovation
10 were then mapped to the 5 AIDED model components to determine the degree of support in
11 the empirical literature for the scale-up process captured in the AIDED model. All authors
12 reviewed the mapping, which was achieved through negotiated consensus and is illustrated in
13 the **Appendix, Tables A1-A8**.
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23 Results

24 *Description of samples*

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26 We interviewed a total of 33 key informants (**Table 1**). Our search of peer-reviewed
27 literature returned 1,446 unique articles, of which 41 were retained for data extraction based
28 on our review criteria; 4 additional papers not identified through the electronic
29 search were obtained from the authors' files (**Figure 2**). Additionally, our search of the gray
30 literature returned 30 unique sources for data extraction. [The full list of references reviewed
31 and an example of a full electronic search strategy, for community health worker literature, are
32 included in the Appendix.](#)
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41 *The AIDED model*

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43 Analysis of in-depth interview data and the synthesis of the peer-reviewed and gray
44 literature revealed 5 interrelated components of the scale up process: assess the landscape,
45 innovate to fit user receptivity, develop support, engage with user groups, and devolve efforts
46 for spreading the innovation, which together comprise the AIDED model (**Figure 3**). The data
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highlighted the complexity and non-linearity of the process, which included multiple feedback loops. Key informants nonetheless indicated that donors and implementers rarely appreciated this complexity:

There's a lot of magical thinking about what this "pilot project" or "proof of concept" will do because it's not very real in terms of the stakes necessary to actually sustain for impact and scale. (Interview #3)

Assess the landscape. The first component involved obtaining a precise understanding of the receptivity of the user groups and of the environmental context of the user groups. Key informants suggested that a primary limitation of scale up efforts was poor understanding of what communities wanted and what made them receptive to the innovation; multiple studies (14, 15) highlighted the importance of conducting an in-depth assessment prior to launching dissemination efforts.

In public health, there is often a lot of confusion between the need and the demand for innovations. There is a tendency to approach the idea with, "okay, if I look at the incidence of this particular disease and I know that this particular intervention can solve that disease...then, why isn't this diffusing more?" You have to work from what consumers want. (Interview #23)

In addition, the assessment component included examining environmental conditions that may promote or impede take up of the innovation. Key informants explained that such conditions include the political, regulatory, economic, social, cultural, and technological environments. Relevant assessments may span multiple levels from the local to the global, as expressed by one key informant with regard to breastfeeding programs:

Assessments occur at various levels. You have the assessment in the community to find out the beliefs and practices in the community. You have opinion leader research...to find out where you stand in terms of policies and their attitudes towards breastfeeding,

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9 and then stakeholder analysis. So we have all those types of assessments at the very
10 beginning. (Interview #12)

11 **Innovate to fit with user receptivity.** This component included adapting the innovation
12 to local context and preferences, so that receptive users would perceive the innovation as
13 providing relative benefits in their specific context or environment. Adaptation involved making
14 changes to the design and packaging of the innovation and was highlighted by key informants
15 and in the literature (14). Involvement of stakeholders from user groups at this early stage
16 facilitated matching between the innovation and user group receptivity. One key informant
17 highlighted the importance of precise fit to a particular context in the case of Depo-Provera:
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25 To activate this [the injection], it is very simple. A super simple device, it was not a hand-
26 me-down. This was reengineered for the developing country. There was no developed
27 country use for this technology at all. (Interview #1)

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30 Non-technical features of the innovation design and packaging were also noted as
31 important. In the case of CHWs as an innovation, experts spoke about CHW task assignments,
32 role definitions, and community perceptions as examples of design and packaging. Key
33 informants highlighted how the visible benefits of using CHWs generated a perceived
34 advantage for the innovation, which was critical to its fit with the community needs and wants,
35 and subsequent take up:
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42 The community has to see CHWs as valuable. If they are doing something the
43 community really values, it will work....In Nepal, CHWs were valued by the community
44 mostly because [of] the Vitamin A program where the community health worker would
45 give Vitamin A to kids. And that lowered mortality fast, and the communities really
46 valued that. It raised the community health worker status quickly because they had
47 Vitamin A. [Also], kids are dying of pneumonia and [if] the community health worker
48 can save the kid by getting them to the right place and having medicines, then [the]
49 community values that. It is very visible. (Interview #11)

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Develop support. This component referred to priming the environment to be supportive of increased use of the innovation. Developing support involved enhancing education as well as identifying and addressing resistance to the innovation. Key informants described resistance from groups that might suffer economic or political losses if the innovation became routine practice:

What you hear at the ministries of health is from people whose livelihood may be affected or whose turf or influence they think is being diminished. So, you know, nurses in Kenya right now...we are getting from the nursing association that we have unemployed nurses in Kenya. Why should we have community workers giving Depo injections ...the midwives and doctors will give similar answers and... it turns out to be a turf battle. (Interview #14)

Involving these groups in assess and innovate components was also viewed as helpful to addressing resistance and building support. Inadequate development of support and emerging resistance from stakeholders were common reasons cited for failure of scale up efforts in the literature (16-19). Key informants emphasized the importance of strategic networking and collaboration in the development of political and economic support and support at the regional, national, and global levels.

If you understood the political science and the political economy you'd see actually what I need to do is I need to target policy makers first. (Interview #5)

One [effort is] focused at the policy level and working with decision makers...getting them the information that they need to then further promote or, if they are not already convinced, to help them be convinced. (Interview #14)

Legal and regulatory action that supported the innovation also played a critical role according to key informants. For instance, in the case of exclusive breastfeeding, both key informants and

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9 the literature (17, 19, 20) noted the importance of legislation in providing paid maternity leave
10 and curbing the marketing of substitutes for breast milk in several countries including Brazil:

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13 Another important aspect that came...were the policies that were...elected by the
14 government...[it was] decided to provide four months of paid maternity leave to formal
15 working women....so '88 came this decision, this law, and also in 1988...an approval of
16 the National Code of Marketing of Breast-Milk Substitute...also important for the
17 continuation of the pro-breastfeeding campaign. (Interview #22)

18
19 Understanding and addressing resistance was often accomplished by using data, in
20 some cases from controlled trials funded in the country and in other cases through more non-
21 traditional forms of data. For instance, the highly successful scale up of CHWs in Pakistan
22
23 involved building political support through evidence-based advocacy:
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27 We spent a year collecting and generating local data from the district on perinatal
28 mortality, its distribution, and causes of death. This more than anything was critical in
29 focusing the attention of the local politicians and policy makers. [We] made several
30 presentations to the Minister of Health and the Director General ...to persuade them of
31 the importance of doing something and getting the buy-in from the program people.
32 (Interview #27)

33
34 Key informants underscored the role of economic incentives in developing support for
35 the innovation and to propel scale up. In the case of Depo-Provera, for instance, key informants
36 discussed the importance of developing sufficient incentives to produce, sell, and buy the
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38 product:
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42 It's really not rocket science. You get a product; you put it in a box....If it's cheap
43 enough, people will buy it. If it's too cheap, retailers won't stock it. Play with those two
44 variables. The margins have to be attractive to those within the retail chain, but the end
45 price has to be affordable to the consumer. (Interview #7)

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47 You promise [the manufacturer] more volume, asking them for lower margins. And the
48 premise was that that drug now would go to the supply chain and end up at the
49 frontline at between 30 and 50 cents, more or less. (Interview #3)

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Economic disincentives were noted as major sources of resistance, particularly in the areas of exclusive breastfeeding and use of CHWs, which were viewed by infant formula companies and clinicians, respectively, as crowding out their businesses. As a key informant said:

Despite their desire to breastfeed, [women] cannot do it because of economical reasons, social reasons...what kind of incentives should be given to women and families in order to increase the prevalence of choosing breastfeeding....It's a competition between different priorities that women go through. It's not that they don't want to. They have to do something else, to go to work. So the financial incentives would be important I think and that has not been done. (Interview #8)

Engage with user groups. Engagement with user groups was viewed by key informants as occurring throughout the scale up process and involved several necessary steps: 1) introduction of the innovation from outside the user group to inside the user group via boundary spanners, 2) translation of the innovation so that user groups could assimilate the new information, and 3) integration of the innovation into the routine practices and social norms of the user group.

Introduction of the innovation, the first part of the engage component, referred to giving information about the innovation to the user group. Critical to the process, however, was that this introduction be accomplished by someone who had an essential, pre-existing role in the user group and who also has contact with people outside the potential user group, i.e., someone who was a boundary-spanner. Translation, the second part of the engage component, was the process that made the new information clear and understandable to potential user groups, allowing it to be assimilated. Translation included the development of practical instructions, guides, blueprints, and protocols that were comprehensible and relevant for the user group. In reflecting on the success factors in implementing the community health worker

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9 model in Nepal, one key informant described how people in the community collaborated in
10 translation:

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13 One of the reasons the manual was particularly good [was] ...we contracted with the
14 literacy group and with UNICEF because they had the only good artists...And the three
15 groups [the literacy group, UNICEF, and the Ministry] had to work together to produce
16 the sort of communications...that worked with the CHWs. (Interview #11)
17

18 Translation also included more subtle ways to contextualize or frame the innovation in a way
19 that made it appealing to larger numbers of people in the user group, such as describing the
20 innovation using local idioms, stories, or historical examples, or associating the innovation with
21 important values or practices within the group.
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26 We realized that the best [health] counsellors were our cleaning ladies because they
27 knew how to talk with the ladies. They knew the vocabulary, you know....They were
28 from the same neighbourhoods...They were more or less the age of the ladies...They
29 were also mothers having the same problems. They talked to them very easily, not
30 [acting as if] I am the boss here...I think it feels as if they were having a conversation.
31 (Interview #21)
32

33 In some examples, translation occurred via opinion leaders, such as in a reproductive health
34 project in Afghanistan that disseminated information about contraception, including Depo,
35 through religious leaders. The project avoided national religious policy debates but engaged
36 religious leaders at the community level in discussions of the compatibility of contraception
37 with teachings from the Quran. To accomplish this, the contraception was described not as a
38 method of family planning, which would have been controversial, but instead was described as
39 the best way to ensure women could breastfeed for two years, which was the duration
40 prescribed in the Quran.
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9 So the one-on-one discussions with the 37 mullahs in these 3 project areas... [the
10 project manager] had these discussions and...and then all of them could agree that this
11 was okay and it was consistent with Islam. (Interview # 30)

12
13 Once religious leaders were convinced about the fit of the innovation with their values, these
14
15 leaders then endorsed the use of contraception in the broader community.

16
17 So the mullahs as part of their organizing the community [said] here's how we're going
18 to cover the 3,000 people in our community; we've laid out these plans. We'll make sure
19 that these happen, and I will also talk with the men at Friday prayers about
20 contraception. (Interview #30)

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22 The final aspect of the engage component, integration, referred to the embedding of the
23
24 innovation in the routines and social norms of a user group. Integration was enabled by
25
26 support through legislation, educational systems, and changes to broader cultural norms
27
28 beyond the immediate user group. For instance, a key informant described this kind of
29
30 integration relative to breastfeeding in Brazil:

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32 The behaviour change comes with this facilitation [by] the facilities that the woman
33 finds in society. Instead of being sent out of the bus because she's breastfeeding or out
34 of the health centre because she's breastfeeding, on the contrary, she is well received
35 so this behaviour became normal. (Interview #22)

36
37 In other instances, the innovation became part of what was taught and passed down to future
38
39 generations, reflecting its integration into the routine practices of the user group and its
40
41 sustainability over time. For instance, the CHWs in Nepal who grew too old to work passed the
42
43 position down to their daughters. The position was viewed as an honour as it was believed to
44
45 contribute to one's *dharma* for community service (21), which was thought to increase their
46
47 acceptance in what they understood as the "afterlife."

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49 Each of the communities wanted to be a quality midwife and to wear the brand of a
50 Bidan Delima. There was an advertisement campaign, but much more so, it was a peer

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9 pressure, a sisterhood....Women stayed as CHWs for their career, and they ended up
10 passing it down to their daughters. Now that is sustainability! (Interview #10)

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12 **Devolve efforts for spreading the innovation.** This component involved user groups'
13 releasing and spreading the innovation for its re-introduction in new user groups within their
14 peer networks. Key informants underscored the importance of peer networks in facilitating the
15 process of release and spread to new user groups, suggesting that trust among the network
16 members was essential, as described in these examples:
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22 We're having huge success now in family planning in Africa by putting early adopters to
23 counsel other women...I think we are seeing a real normative change in a whole bunch
24 of communities in which we operate around family planning, IUDs, sterilization,
25 injectables because, you know, you get women talking to other women. (Interview #19)
26

27 Key informants noted that relinquishing control over the innovations' spread was
28 ultimately necessary for full scale up; however, doing so presented risks, particularly when the
29 timeline for this transition occurred too soon. Key informants highlighted that "some
30 innovations have some negative and positive spinoffs" (Interview #11). Positive spinoffs of
31 spread included the take up of innovation complements. For example, key informants
32 described how increasing the use of CHWs also spread messages and services that they
33 promoted, such as antenatal care, better hygiene, HIV testing, and other public health efforts.
34
35 In contrast, negative unintended consequences were also identified and some key informants
36 voiced concerns that scale up success should be determined based on comprehensive
37 monitoring and evaluation efforts.
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47 We need a balanced view and measurement impact because sometimes things [can
48 have negative effects]. Think about the pneumonia vaccine. It is good, but it increases
49 illness too maybe. If we can predict that ahead of time, we can plan for it and maybe
50 lessen the negative impacts. (Interview #11)
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Linkages among the components

Although the model that emerged identified 5 common components, key informants cautioned that there was no single, definitive way to achieve effective scale up in every context. Rather, they noted the “myth of the magic bullet (Interview #23),” which was summarized by explaining that “these things are often very contextual, and there isn’t a magic bullet. Just because something worked well in one country, doesn’t mean it’s going to work elsewhere” (Interview #23). Hence, specific actions and strategies within each component remain context-dependent.

Discussion

We identified 5 distinct but interrelated components that comprised the AIDED model of scale up for selected family health interventions in LMIC: assess the landscape, innovate to fit user receptivity, develop support, engage with user groups, and devolve efforts for spreading the innovation. Critical to implementing such an approach is the recognition that the progression through these components may be nonlinear and involve multiple feedback loops, which can necessitate reversions to previous components. The model further indicates that successful scale up is not fully under the control of the innovator, donor or implementer but rather grows organically out of a deep understanding of and engagement with user groups and their environmental contexts.

Although the concepts that emerged from the in-depth interviews and from the systematic literature review were largely consistent, important distinctions between the two

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9 data sources were also apparent. For instance, we gathered more evidence about the
10 component of “assess” from in-depth interviews than from empirical literature. Interviews
11 highlighted the multiple levels of assessment undertaken in successful scale up efforts including
12 assessment of community receptivity, political support, economic viability, and technical
13 feasibility, whereas studies in the empirical literature mentioned assessment in general terms
14 or of only a single type (e.g., community needs assessment). Some empirical studies reported
15 only post-launch phases of the intervention and therefore did not include information about
16 pre-launch assessment, perhaps due to space constraints or the perceived lack of novelty of
17 such information. We also gathered more evidence about the devolve component from the in-
18 depth interviews than from empirical papers, which often reported data to demonstrate
19 widespread uptake but with more limited description of the specific processes used.
20
21 Additionally, the in-depth interviews produced richer detail about failures to scale up with
22 views about the reasons for failure, which were less well documented in the literature. The
23 distinctions highlight the importance of triangulation (8), i.e., using multiple sources of data, to
24 understand complex systems issues and underscore the limitations of empirical literature,
25 which may omit key insights about how scale up has been achieved and underemphasize null
26 findings and failures in scale up.
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43 Despite the widespread agreement about recurrent themes related to the components
44 of the AIDED model, some heterogeneity existed. For instance, interviewees differed in the
45 degree to which they believed that scale up success required private market strategies. Some
46 thought that adequate ongoing government and foundation support was sufficient to promote
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widespread take up while others viewed a private market-based incentive system to be essential. Still others highlighted that the importance of private market versus public sector involvement depended on the type of innovation. Depo-provera, for instance, was viewed by some as being conducive to market-based spread whereas the community health worker model was believed to require ongoing public sector support to be effective as an integral part of the public health system. A second area of heterogeneity across the in-depth interviews was the degree to which successful scale up initiatives followed a top-down approach in which ministries of health and high-level decision makers promoted the innovation or a bottom-up approach in which the user community drove the adoption. Although the interviewees reflected on the importance of support among all levels, views differed in the ordering of attaining that support, underscoring our conclusion that the process is nonlinear and may unfold in diverse sequences without a single path to successful scale up.

The findings suggest that the process of scale up is dependent on a complex adaptive system, which includes several interlocking parts, multiple feedback loops, and many potential pathways to success. The emergent and somewhat unpredictable nature of complex adaptive systems has several implications for policymakers, practitioners, and researchers. First, real-time, valid information flow across the system is essential to effective scale up. Because actors in the system adapt based on what they understand as environmental conditions, misinformation can create suboptimal situations quickly. Therefore, investments in the data infrastructure and the relationships that underpin valid and reliable information flow are paramount. Second, the achievement of widespread innovation use is the result of a multi-

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9 factorial process and cannot be attributed simply to specific, planned actions. Because there
10 are multiple paths to the same outcome, system interventions that include coordination of
11 multiple levels of action (e.g. global, national, local) are most likely to produce successful scale
12 up. Cost-effective management information systems are required for providing the level of
13 coordination needed. Last, because the full outcomes are somewhat unpredictable in complex
14 adaptive systems, it is important to anticipate unintended negative consequences that may
15 emerge and to develop contingency plans for these potential occurrences. Furthermore, careful
16 attention to incentives and accountability systems to limit negative consequences is essential to
17 ethical and effective efforts to disseminate and diffuse innovations.
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27 How does the AIDED model add to existing frameworks for scale up? Several experts
28 have described important frameworks for scale up in low-income countries (4, 7, 22, 23) and in
29 higher-income settings (5, 24-26). Although frameworks differ in their emphasis and
30 comprehensiveness, together these provide a list of domains of variables that may be
31 important for scale up. These include: 1) attributes of the innovation, largely drawn from
32 Rogers' work suggesting innovations are more likely to spread if they have relative advantage as
33 perceived by users, are easy to understand and use, are compatible with current practices, can
34 be tested before large-scale adoption, and have observable results, 2) attributes of the
35 resource system and implementers (i.e., the systems that produces and implement the
36 innovation) such as their credibility, understanding of the environment, technical skills, and
37 management capacity, 3) attributes of the adopting community or user groups including their
38 perceptions of need, readiness to change, capacity to absorb innovations, and engagement in
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the process, and 4) attributes of the socio-political and economic environment including how conducive it is to fostering spread. Some frameworks have also highlighted the importance of the chosen delivery strategy (4) including tailoring the distribution efforts to local situations and using existing social networks (4, 5, 25) to promote spread. In contrast to providing a list of important attributes, the AIDED model both provides a theory of the interrelated actions important for to scale up and organizes them into 5 concrete, clearly defined components. Concepts from existing frameworks, such as relative advantage as perceived by user groups and the role of the environment, pertain to the AIDED model. Our findings, however, provide practical guidance for how one might plan and implement scale up efforts. Additionally, our findings highlight the interactions among the different components of scale up, suggesting that multiple paths may lead to widespread take up of innovations.

To facilitate the practical application of the AIDED model, we developed a template of activities, outputs, outcomes, outcome indicators, and means of measuring progress for each of the 5 components (**Figures 3 and 4**) as well as a set of flow charts illustrating the application of the AIDED model. (See **Appendix, Figures A1-A5**). These matrices and flow charts facilitate the application of the AIDED model in implementation and evaluation of efforts to disseminate, diffuse, and scale up innovations in low-income settings. Over time, such a tool could be refined with application and validated to ensure that the activities identified are those associated with more successful scale up.

Our findings should be interpreted in light of several limitations. The inductive approach used to construct the AIDED model did not allow for simultaneous empirical testing of the

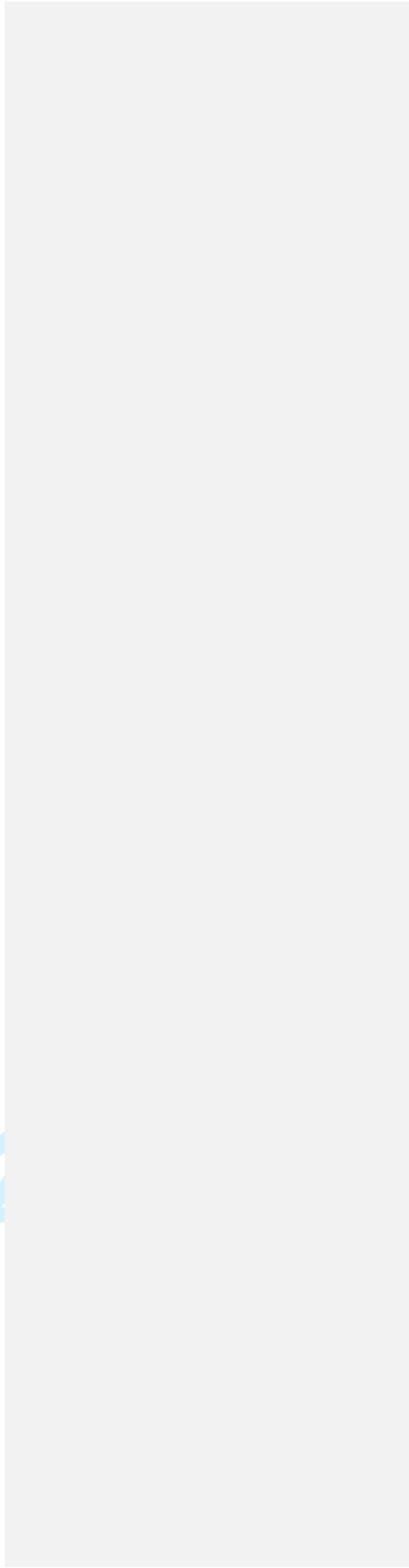
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9 model. Future research is needed to test the AIDED model in diverse contexts. Additionally,
10 many of the interviewees were affiliated with the BMGF. This foundation is managing \$1.5
11 billion in family health programs and has a highly diverse staff with deep experience and
12 expertise in this area including prior to their affiliation with the BMGF. Nevertheless, this may
13 limit the transferability of our findings to other contexts. Furthermore, [only 1 article reported a](#)
14 [randomized controlled trial, and most studies were observational or qualitative in nature,](#)
15 [limiting the ability to make causal inferences.](#) The literature may [also](#) have publication bias (27)
16 in which negative studies are underrepresented, and interviews may have social desirability
17 bias (28), in which participants may have misrepresented their experiences in order to provide
18 desirable answers. Nonetheless, we did find cases of unsuccessful scale up in the literature, and
19 we probed intentionally to elicit both positive and negative experiences from key informants in
20 order to minimize bias. Last, the AIDED model did not address long term, sustained use of
21 innovations that are successfully scaled up. This will require longitudinal research examining
22 contrasting levels of success sustaining the scaled up innovations in different settings.
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37 In sum, we identified 5 key components, which our findings suggest interact in a
38 complex adaptive system to explain the process of widespread take up and anticipate the
39 success of scale up efforts. Paradoxically, complex adaptive systems are at once capable of fast
40 and sweeping changes and homeostatic. Despite substantial changes that can occur within a
41 complex adaptive system, each part of the system responds to disturbances in such a way that
42 the system can maintain the status quo. We identified in this paper several leverage points for
43 launching substantial changes in large systems. Nevertheless, recognizing the fundamental
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complexity of the scale up process, funders and innovators alike will require flexible strategies of assessment, innovation, development, engagement, and devolution to enable effective change in the use of family health innovations in LMIC.

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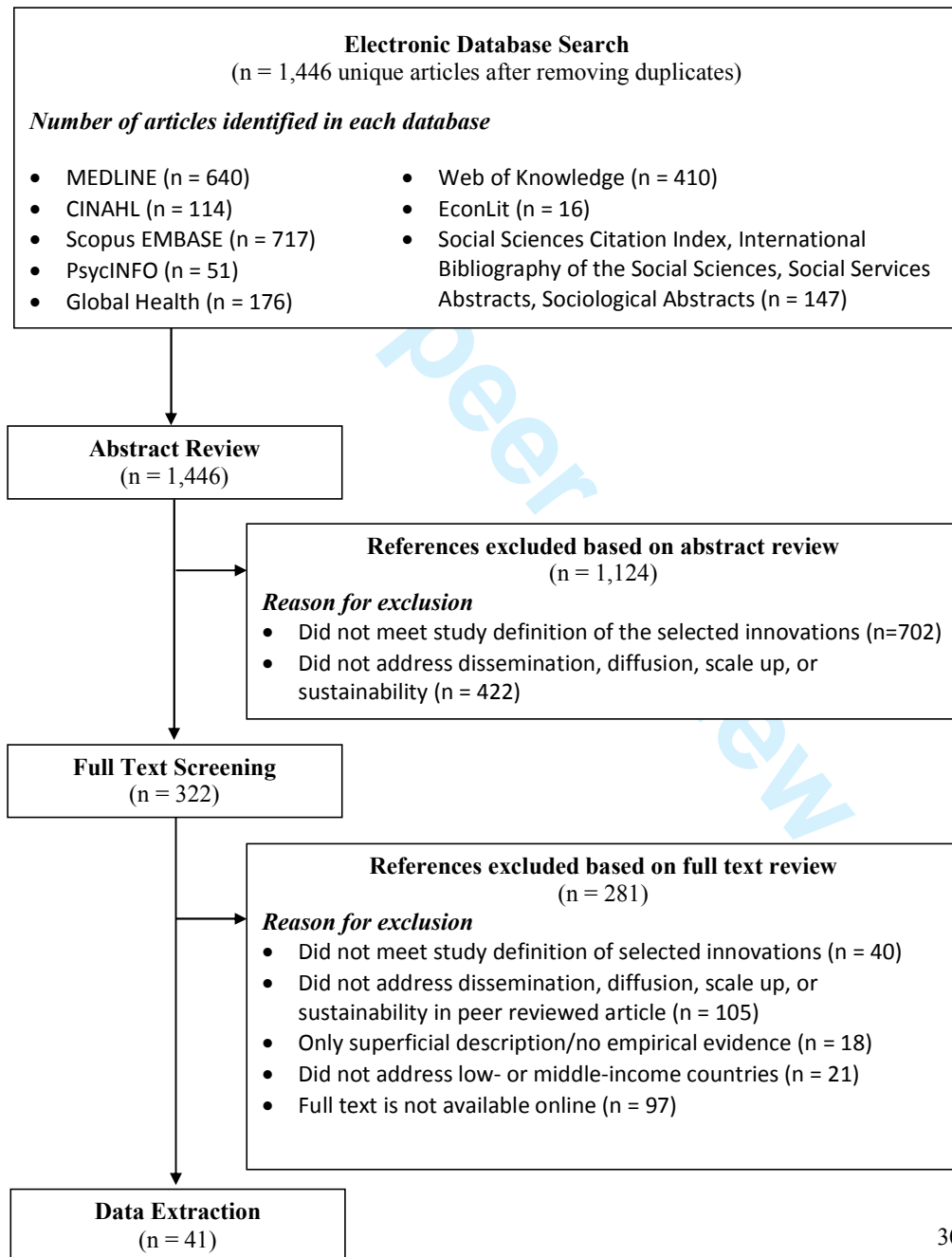
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Figure 1. Discussion guide used in key informant interviews.

1. Let's start by having you describe your role in implementing this intervention. What was your role and how long were you involved?
2. We are interested in your experience with scaling the intervention. What was the process, from implementation to scale-up of the intervention? Walk me through that.
 - What was the goal?
 - How did you first approach addressing the issue and implementing the intervention?
 - What were the key components of the process?
 - Did you come to the process with any pre-conceived ideas about how you would accomplish the task? Can you describe those?
 - How did you/are you measuring success?
3. What kinds of challenges came up and how did you handle those?
4. Looking back, is there anything that might have been done differently?
5. Is there anything else we should have asked to help us understand your experience with the intervention and process of implementation and scale-up better?

Figure 2. Selection of peer-reviewed literature^{1,2}



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¹ During the review, 4 additional papers not identified through the electronic search were obtained from the authors' files, resulting in a total of 45 peer-reviewed articles for review.

² Gray literature was obtained from the following Websites: WHO, UNICEF, UNDP, UNFPA, the World Bank, the African Development Bank, the Inter-American Development Bank, the Asian Development Bank, USAID, CIDA, DFID, SIDA, GTZ, the Global Fund to Fight AIDS, Tuberculosis and Malaria, CARE, GAIN, Family Health International, Partners in Health, Management Sciences for Health, and John Snow, Inc.

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Table 1. Characteristics of key informants

| Characteristic | Number | % |
|---|--------|-------|
| Area of expertise | | |
| Family planning (Depo-Provera) | 7 | 21.2% |
| Social marketing | 6 | 18.2% |
| Policy making | 6 | 18.2% |
| Community health worker approaches | 5 | 15.2% |
| General | 5 | 15.2% |
| Breastfeeding | 4 | 12.1% |
| Affiliation | | |
| Nongovernmental organization | 20 | 60.6% |
| Government | 4 | 12.1% |
| United Nations agency | 3 | 9.1% |
| Consultancy | 3 | 9.1% |
| Academic | 3 | 9.1% |
| Disciplinary background | | |
| Maternal and child health | 7 | 21.2% |
| Health systems research and programs | 6 | 18.2% |
| Health policy | 5 | 15.2% |
| International development and economics | 4 | 12.1% |
| Epidemiology/Medicine | 3 | 9.1% |
| Reproductive health | 3 | 9.1% |
| Anthropology | 2 | 6.1% |
| Health communications | 2 | 6.1% |
| Management | 1 | 3.0% |

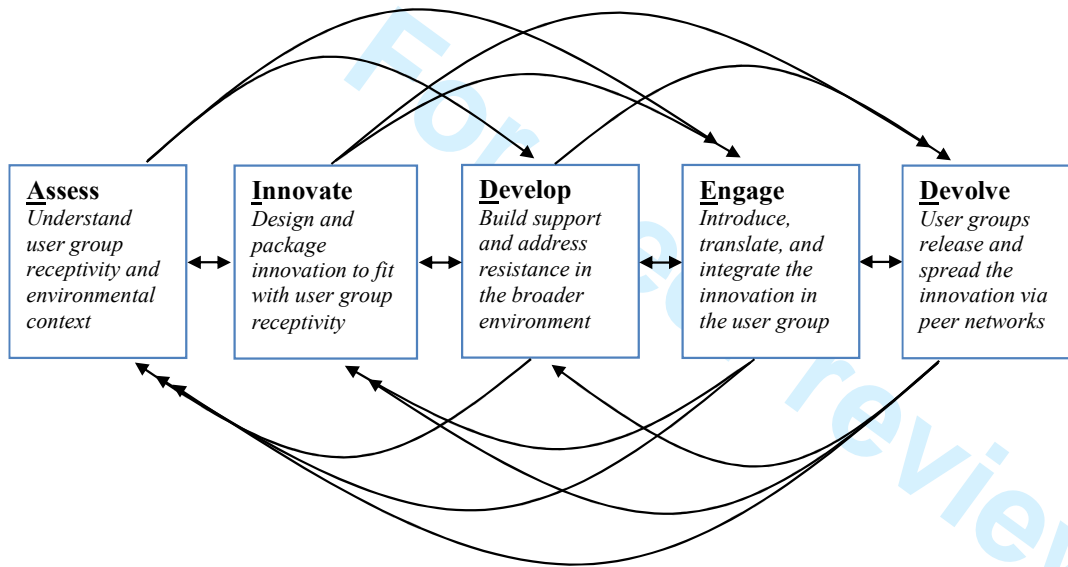
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Table 2. Characteristics of peer-reviewed (n = 46 sources) and gray literature (n = 30 sources)

| Characteristic | Number (Percent) of Sources |
|---|-----------------------------|
| Methodology¹ | |
| Review of literature or existing data | 25 (33.3%) |
| Case study | 25 (33.3%) |
| Qualitative interviews, focus groups, observations | 14 (18.6%) |
| Cross-sectional study | 10 (13.3%) |
| Pre-post intervention study | 11 (14.6%) |
| Simulation study | 1 (1.3%) |
| Randomized controlled trial | 1 (1.3%) |
| Mixed methods | 1 (1.3%) |
| Geographic Region (as defined by the World Bank)¹ | |
| Africa | 26 (26.5%) |
| East Asia and Pacific | 23 (23.5%) |
| South Asia | 20 (20.4%) |
| Latin America and Caribbean | 15 (15.3%) |
| General/None stated | 12 (12.2%) |
| North Africa and the Middle East | 2 (2.0) |

¹ Percentages sum to more than 100% because some articles had more than one methodology and/or had covered multiple regions

Figure 3. Schematic of the AIDED model of scale up



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Figure 4. AIDED model activities and outputs.

| <u>Component</u> | <u>Activities within component</u> | <u>Outputs from activities</u> |
|------------------|---|--|
| ASSESS | 1. Landscape assessment | 1. Mapping of environmental conditions that would support or be barriers to use of the innovation in its pre-existing form has been created |
| | 2. User group needs assessment | 2. List of prioritized needs and wants of the index user groups has been compiled and reviewed with members of index user groups; : understanding of user group’s receptivity to the innovation is clear |
| | 3. Readiness for change assessment | 3. Measure of readiness for change in the area of the innovation has been developed and evaluated |
| INNOVATE | 1. Tailor design and packaging of innovation to index user groups’ needs/wants | 1. Well-tailored innovation has met index user groups’ needs/wants identified in assess component; innovation has been adapted to fit the receptivity of the user group |
| | 2. Test market (e.g., conduct focus groups of index user group members to determine ‘fit’ and willingness to pay) | 2. Test marketing results have been synthesized for review |
| DEVELOP | 1. Cultivate support among high-level champions | 1. High-level champions have manifested their support for the innovation |
| | 2. Promote policy reforms | 2. Needed policy reforms have been enacted |
| | 3. Facilitate knowledge sharing and technology transfer | 3. Mechanisms for knowledge sharing and technology transfer have been established or needed knowledge/technology has been acquired |
| | 4. Employ social marketing techniques to foster new norms | 4. Social marketing campaigns have leveraged cultural norms to build support for the innovation |

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|----------------|---|--|
| ENGAGE | <ol style="list-style-type: none"> 1. Identify boundary spanners and introduce them to innovation 2. Develop tools and collaborations to assist in translation of the innovation within index user groups <p><i>Inside index user groups:</i></p> <ol style="list-style-type: none"> 3. Translate innovation to facilitate integration into index user groups' norms 4. Integrate innovation into index user groups' norms 5. Encourage adaptation and replication of innovation within index user group | <ol style="list-style-type: none"> 1. Boundary spanners with pre-existing roles within the user groups have been identified and are introducing innovation in index user groups 2. Tools for translation, developed in collaboration with people in index user groups, exist 3. Innovation has been translated into terms that are accessible, familiar, and attractive to index user groups 4. Index user groups feel ownership over the implementation of the innovation 5. Adapted and replicated versions of the originally introduced innovation have emerged from index user groups |
| DEVOLVE | <ol style="list-style-type: none"> 1. Map social networks of index user groups along which innovation may spread 2. Facilitate movement of innovation across the boundary (from inside to outside) of index user groups 3. Introduce innovation to boundary spanners from other (non-index) user groups | <ol style="list-style-type: none"> 1. Social network mapping (to use as basis for determining which other user groups to monitor for subsequent knowledge/use of innovation) 2. Innovation has been shared by members of index user groups with external parties who share similar receptivity to the innovation 3. Boundary spanners from other (non-index) user groups have been exposed to the innovation |

Note: The model takes as its starting point that an innovation exists in some form, and addresses the question of how to scale up use of that existing innovation

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Figure 5. AIDED model outcome measures

| <u>Component</u> | <u>Outcome of component</u> | <u>Outcome indicator</u> | <u>Means of measuring outcome indicator</u> |
|------------------|---|---|--|
| ASSESS | Identification of changes needed in (a) the innovation itself, (b) the environment, or (c) the user group in order to support use of the innovation in index user groups (<i>(a) is addressed in innovate component, (b) in develop component, and (c) in engage component</i>) | Documentation of changes needed in innovation, environmental conditions, and user groups in order to support use of the innovation in index user groups | Synthesis report of the assessments completed |
| INNOVATE | Achievement of acceptable threshold of fit between innovation and index user groups | Degree of 'fit' of innovation to index user groups | Results from test marketing (focus groups, willingness to pay studies, market analysis) |
| DEVELOP | Barriers to the innovation have been mitigated and support for the innovation has been secured in the political, regulatory, economic, socio-cultural, technological, and knowledge environments of index user groups | Degree of support for innovation in political, regulatory, economic, socio-cultural, technological, and knowledge environments | Required environmental changes identified in the assess component have all been addressed; Stakeholder analysis; Follow-up landscape assessment to identify any new barriers that have emerged |
| ENGAGE | a. Innovation is in use by a target percentage in index user groups (i.e., number of users divided by the total members in index user groups) b. Innovation is perceived as 'standard' by target percentage in index user | a. Extent of knowledge, perceptions, and use of innovation in index user groups b. Degree to which innovation is perceived as 'standard' by | Primary data collection in index user groups regarding use and perceptions of innovation (could include surveys, in-depth interviews, focus groups, participant observation) |

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|----------------------------|--|---|---|
| | groups | index user groups | |
| | c. Innovation is evolving to be more compatible with local social norms due to adaptation efforts by index user groups | c. Degree to which adapted innovations are faithful to originally introduced innovation (in impact) | |
| DEVOLVE | a. Index user groups have shared the innovation with other user groups | a. Level of awareness of innovation in larger set of user groups | Primary data collection in index user group regarding awareness and use of innovation (e.g., surveys, in-depth interviews, focus groups, participant observation) |
| | b. Innovation is in use by target percentage in user groups beyond index user groups | b. Extent of knowledge, perceptions, and usage of innovation in larger set of user groups | |
| OVERALL AIDED MODEL | Intended health impact is realized in the target population | Change in relevant target population health indicators | Population surveys, surveillance data |

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APPENDIX

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Example of full electronic search string for community health workers innovation

Comment [YUN2]: Added per request

MEDLINE OVID SEARCH STRING – Innovation: Community Health Workers

Search limited to studies published on or before search date of 21 December 2010.

1. Community health aides
2. Community adj1 worker*
3. Village adj1 health adj1 worker*
4. Community adj1 health adj1 aide*
5. Barefoot adj1 doctor*
6. Health adj1 mediator*
7. Lay adj1 health adj1 worker*
8. Promotores de salud
9. Peer adj1 counselor*
10. (village* or lay or community) adj1 health adj1 (worker* or aide*).mp.
11. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10
12. Exp "Diffusion of Innovation"
13. Technology transfer
14. Information dissemination/
15. Acculturation
16. Assimilat*
17. Sustainabilit*
18. Diffusion
19. Disseminat*
20. Replicat*
21. Fidelity
22. "scale up".mp.
23. "scaled up".mp
24. "take up".mp.
25. "taken up".mp
26. 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23
OR 24 OR 25
27. 11 AND 26

Table A1. Enabling factors for the dissemination, diffusion, scale up, and sustainability of Depo-Provera by AIDED model components

| Enabling factor | # sources citing factor | AIDED model component(s) mapped to factor |
|--|-------------------------|---|
| Development of delivery system supports (training of health workers/field motivators, creation of training manuals or checklists, supply chain improvements, recruitment of women, chart tracking) | 9 | Develop |
| Tailoring innovation to existing system capacity (CBD systems already in place, women in CHW roles, other existing program infrastructure (ie. Well baby clinics), current supply chain flows) - | 8 | Innovate |
| Landscape or stakeholder assessment | 6 | Assess |
| Use of social networks | 5 | Devolve |
| Collaboration with stakeholders to identify or creating supportive structures in the economic, political and technological spheres | 5 | Assess, Develop |
| Dialogue with community at early stages | 5 | Assess, Engage |
| Effective education through social marketing re: risks and instructions (including community input) | 4 | Develop, Engage |
| Piloting to determine feasibility | 3 | Assess |
| Innovation design features (injectable at 3 month intervals) | 3 | Innovate |
| Ensuring 'fit' with cultural norms (can take in secret) | 3 | Assess, Innovate |
| Use of data to improve program performance | 3 | Engage |
| Nationalistic messaging (population control, etc.) | 2 | Develop |
| Adherence to religious norms (support of leaders) | 1 | Innovate, Develop, Engage |
| Identifying potential sources of resistance, such as from the professional medical community | 1 | Assess |
| Creating structures to ensure use of assessment findings through implementation and scale up (e.g., the same individuals that conducted the assessment remained involved through the process of scaling) | 1 | Assess |

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Table A2. Barriers to the dissemination, diffusion, scale up, and sustainability of Depo-Provera by AIDED model components

| Barrier | # sources citing factor | AIDED model component(s) mapped to factor |
|---|-------------------------|---|
| Lack of system capacity (delivery/administrative challenges, lack of equipment, supply chain stockouts due to mismanagement, staff burden) | 5 | Innovate, Develop |
| Rural nature of program areas (made supply chain and human resource chain difficult to maintain) | 5 | Devolve |
| Inadequate resources for scaled-up activities (declined as expansion proceeded) | 4 | Devolve |
| Competing alternatives (in family planning product; eg. other brand names, delivery sector; eg. public vs private) | 3 | Develop |
| Misaligned government policies and priorities (favored HIV/AIDS projects, within FP, emphasized long acting methods, favored provision of FP through medical personnel) | 3 | Assess, Develop, Devolve |
| Data collection challenges (contact between front line and supervisors too rare, front line not understanding tools, follow-up challenges etc.) | 3 | Develop |
| Social/cultural norms (male dominance/power concerns about fidelity and family size; mothers in law) | 1 | Assess, Innovate, Engage, |
| Lack of knowledge/awareness (inadequate counseling/patient education/lack of patient centered care, information sharing) | 1 | Develop, Engage |
| Opposition by medical professionals | 1 | Assess, Engage |
| Lack of ongoing stakeholder support (key leaders left after pilot phase) | 1 | Devolve |

Table A3. Enabling factors for the dissemination, diffusion, scale up, and sustainability of exclusive breastfeeding by AIDED model components

| Enabling Factor | # sources citing factor | AIDED model components mapped to factor |
|--|-------------------------|---|
| <u>Contextual</u> | | |
| International advocacy groups: IBFAN, WABA | 5 | Develop |
| Evidence-based recommendations: timely initiation of BF; EBF for 6 months (WHO) | 5 | Develop |
| International consensus meetings/declarations: Bellagio and beyond | 8 | Develop |
| <u>Political support</u> | | |
| Cost/savings analyses | 6 | Assess |
| Local advocacy & coalition building, including public opinion leaders | 8 | Develop |
| Civil society mobilization & engagement | 6 | Develop |
| Political sensitization | 6 | Develop |
| Political will | 6 | Develop |
| Long term commitment to scaling-up | 9 | Devolve |
| <u>Process and sustainability facilitators</u> | | |
| Research and evaluation | | |
| Baseline facility and community needs assessments | 7 | Assess |
| Operational (formative) research/pilot studies | 8 | Assess |
| Program delivery | | |
| Facility-based delivery system: e.g., BFHI | 8 | Innovate, Develop, Engage, Devolve |
| Community-based EBF promotion & support: baby friendly primary health care units, peer counselors, community health workers, mother-to-mother support groups | 8 | Innovate, Develop, Engage, Devolve |
| Communications/mass media campaigns; targeting opinion leaders, policy makers, mothers; simple and doable messages; celebrities | 8 | Innovate, Develop, Engage |
| Visible community events: world breastfeeding week, other | 3 | Innovate, Engage, Devolve |

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| Program delivery through other existing programs: immunizations, diarrheal control, family planning, and other programs | 6 | Innovate, Develop, Engage, Devolve |
| Workforce development | | |
| Training: administrators, health professionals, and paraprofessionals | 10 | Develop, Devolve |
| Endorsement from medical societies | 3 | Develop |
| Medical/nursing school curriculums | 3 | Develop |
| Legislation | | |
| Legislation: maternity leave, work place, WHO Code | 6 | Develop, Devolve |
| Program coordination and quality control | | |
| Intersectoral coordination: government, civil society (NGOs, philanthropists), medical societies, academic researchers, mass media | 8 | Develop, Engage, Devolve |
| Monitoring and evaluation; low-cost; rapid response | 6 | Assess, Devolve |

Table A4. Barriers to the dissemination, diffusion, scale up, and sustainability of exclusive breastfeeding by AIDED model components

| Barrier | # sources citing factor | AIDED model component(s) mapped to factor |
|--|-------------------------|---|
| Unethical marketing of infant formula | 7 | Develop, Engage, Devolve |
| Maternal employment | 2 | Engage |
| Unsustainable workforce development system (affects sustainability) | 3 | Devolve |
| Overburdened staff in medical facilities & in community health settings | 1 | Devolve |
| CHW investment just to promote BF difficult to justify | 5 | Develop, Devolve |
| Strong dependency on international aid (affects sustainability) | 3 | Devolve |
| Weak M&E systems | 3 | Assess, Develop, Devolve |
| Prolonged lag time before impacts can be detected | 1 | Devolve |
| Lack of community-level BF promotion and support | 3 | Develop, Engage, Devolve |
| Unpaid "volunteers" high turnover | 3 | Develop, Devolve |
| Cultural beliefs: "insufficient" milk, other | 5 | Innovate, Engage |
| Lack of multilevel incentives | 1 | Assess, Devolve |
| Program "fatigue" | 2 | Devolve |
| Lack of referral system for lactation management problems | 1 | Engage |
| Poor interpersonal communication skills among peer counselors/community health workers | 2 | Assess, Develop, Engage |

Table A5. Enabling factors for the dissemination, diffusion, scale up, and sustainability of community health workers (CHW) by AIDED model components

| Enabling factor | # sources citing factor | AIDED model component(s) mapped to factor |
|---|-------------------------|---|
| CHWs were recruited from and/or by the community | 11 | Innovate; Engage |
| Consistent management and supervision of CHWs and CHW program | 10 | Innovate |
| Ministry of Health or other government support, as reflected in financial support and rewards for CHWs, advocacy for CHWs, or initiation of CHW program | 9 | Develop |
| Integration/cooperation with broader health system/existing health care providers | 9 | Innovate; Develop |
| Respected and motivated people were selected as CHWs | 8 | Innovate; Engage |
| CHW approach was aligned with religious, moral, or ideological norms of social service | 8 | Assess; Innovate; Engage |
| Pay, stipend, or transportation support provided | 7 | Innovate |
| Strong community partnership/support/champions, including cooperation of CHW program with existing community organizations | 6 | Innovate |
| Tasks of CHW viewed as valuable and focused by community | 6 | Innovate; Engage |
| Gender/female involvement | 5 | Innovate |
| Intensive training (some sources specify ongoing or interval training) | 5 | Innovate |
| CHW position was viewed as path to a job later | 4 | Innovate; Engage |
| Regular monitoring and feedback; evaluation data used | 3 | Innovate |
| Assessment of/adaptation to community needs | 3 | Assess; Innovate; Engage |
| Effective supply chain | 3 | Innovate |
| Sufficient funding available for CHW program (specific funding mechanisms for CHW program established) | 2 | Develop |
| CHWs were given preferential treatment/access to other health and development services (e.g., micro-credit, appointments at health clinic) | 2 | Innovate; Develop |
| CHWs work in teams/networks | 2 | Innovate |

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| Narrowly focused set of tasks/role (disease-specific) | 2 | Innovate |
| Program targeted to communities with favorable characteristics (e.g., educated residents but limited employment options, commitment to improving own health) | 2 | Assess; Innovate; Engage |
| Children or family members of CHWs assumed CHW role when CHW retired | 1 | Devolve |
| CHW role is well defined and clear to CHW, community, and health system | 1 | Innovate; Develop; Engage |
| CHW training involves community and/or health facility field experience | 1 | Innovate; Engage |
| CHWs coordinated their activities with non-health sector development programs | 1 | Develop |
| Co-financing of CHW program by multiple levels of government (e.g., central, state, and municipal) | 1 | Develop |
| Design of CHW incentives based on behavioral science models | 1 | Innovate |
| Nonmonetary incentives provided (e.g., food or household goods, certificates, identification badges, job aids) | 1 | Innovate |
| Flexible schedule for fulfilling CHW role | 1 | Innovate |
| Charismatic initial leader of CHW program | 1 | Innovate |

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60**Table A6. Barriers to the dissemination, diffusion, scale up, and sustainability of community health workers by AIDED model components**

| Barrier | # sources citing factor | AIDED model components mapped to factor |
|---|-------------------------|---|
| Not enough pay or incentive for CHWs; CHWs wanted other employment, found other employment that paid more, or had other employment/work that competed with CHW role | 12 | Assess; Innovate |
| Weak or inconsistent management and supervision of CHWs and CHW program | 9 | Innovate |
| Lack of community support or lack of perceived value of CHW | 8 | Innovate; Engage |
| CHW was not respected or not integrated in hierarchy of health system | 7 | Innovate; Develop |
| Poor training of CHWs | 6 | Innovate |
| Lack of supplies needed by CHWs | 5 | Innovate |
| Unpredictability or reduction of donor funding for CHW program | 4 | Develop |
| Provider resistance to CHW role | 4 | Develop |
| Lack of or reduction in support from Ministry of Health, competition from other health programs | 4 | Develop |
| Distance between houses/work sites | 3 | Innovate |
| Lack of support from family members/spouses for CHWs' role | 2 | Assess; Engage |
| Stress/low morale among CHWs; CHWs feel overwhelmed by assigned tasks | 2 | Innovate |
| Inconsistent payment of monetary incentives (e.g., payment did not come on time or in promised amount) | 2 | Innovate |
| CHW health messages conflicted with community values/beliefs | 2 | Assess; Innovate; Engage |
| Lack of fidelity to recommended disease diagnosis and treatment practices | 2 | Innovate |
| Community views CHW as government employee rather than community volunteer | 2 | Engage |
| Inequitable distribution of incentives among different types of CHWs (e.g., some categories paid, others unpaid) | 1 | Assess; Innovate; Develop |
| Social norms around gender roles/ resistance to women | 1 | Assess; Engage |

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| working as CHWs | | |
| Community mistrust of external NGO sponsoring CHW program | 1 | Engage |
| Competition from private sector drug vendors | 1 | Develop |
| Failure to secure local government support for CHW program | 1 | Develop |
| Political upheaval | 1 | Develop |

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Table A7. Enabling factors for dissemination, diffusion, and scale up, and sustainability of social marketing by AIDED model components (n=17)

| Enabling Factor | # sources citing factor | AIDED model component(s) mapped to factor |
|---|-------------------------|---|
| Comprehensive formative research to enable market segmentation, tailored messaging and delivery strategies | 5 | Assess, Innovate |
| Professional standards/training for social marketing practitioners | 1 | Engage |
| Use of indigenous institutions (e.g. local authorities) and people in program planning, operation and evaluation | 6 | Innovate, Engage, Devolve |
| Government support (economic, regulatory) | 2 | Develop |
| Public-private partnerships | 7 | Innovate, Develop, Engage, Devolve |
| Purposeful engagement at all levels with the various stakeholders identified as essential to social marketing's success | 1 | Engage |

Table A8. Barriers to the dissemination, diffusion, scale up, and sustainability of social marketing by AIDED model components (n = 17)

| Barrier | # sources citing barrier | AIDED model component(s) mapped to factor |
|---|--------------------------|---|
| Lack of community participation/top-down strategies | 3 | Innovate, Engage |
| Weak commercial infrastructure | 1 | Devolve |
| Lack of formative research to understand social/cultural norms, preferences and concerns of target user group | 1 | Assess, Innovate |
| Insufficient attention to social determinants of health | 3 | Innovate |
| Inadequate documentation of lessons learned and success stories of social marketing | 3 | Develop |
| Limited evidence of cost-effectiveness | 4 | Develop |
| Perception of social marketing as poorly defined or insufficiently rigorous field | 2 | Develop, Engage |
| Competition from public sector and subsidized programs | 1 | Develop, Devolve |

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Figure A1. Assess component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement

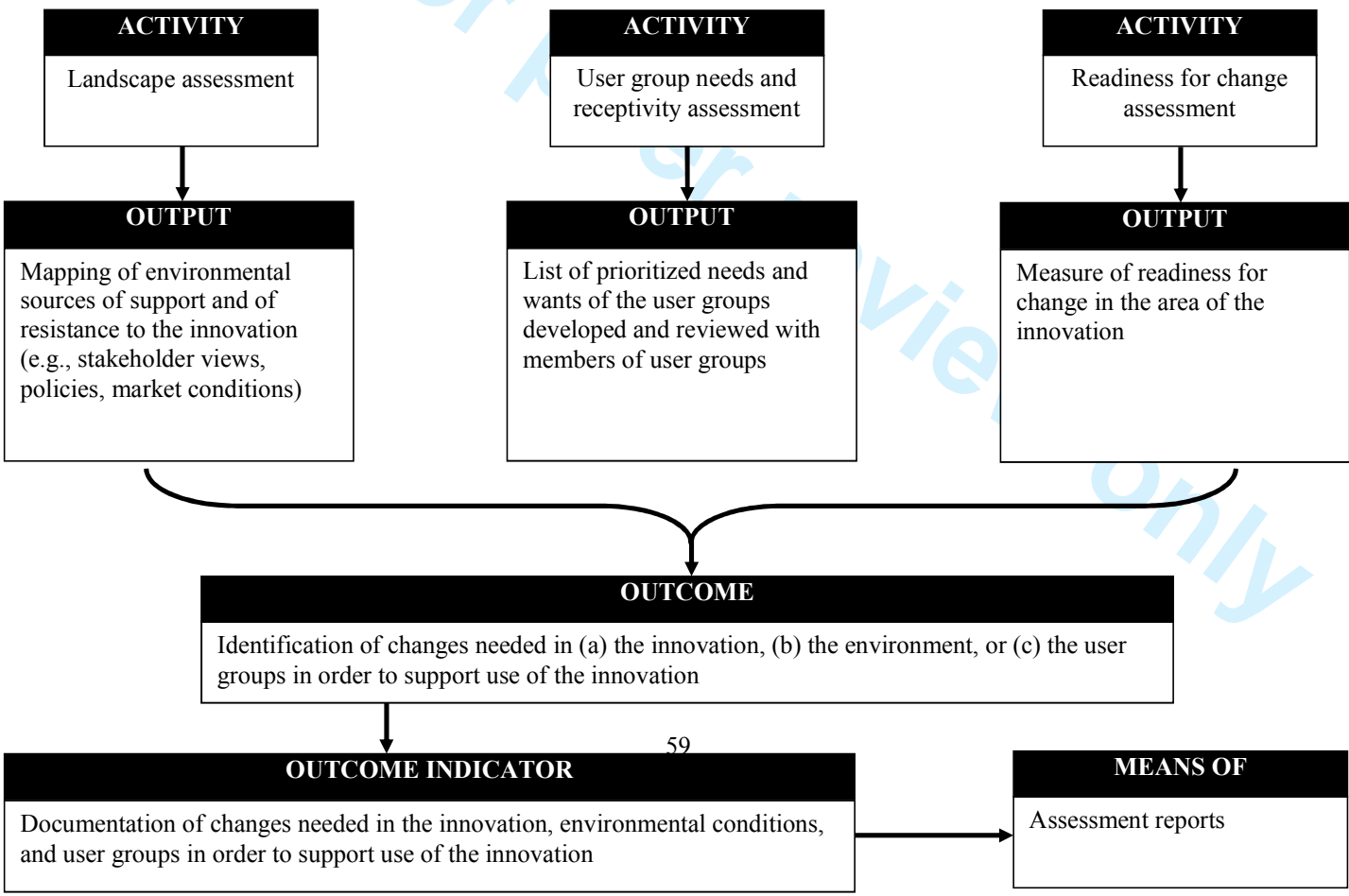
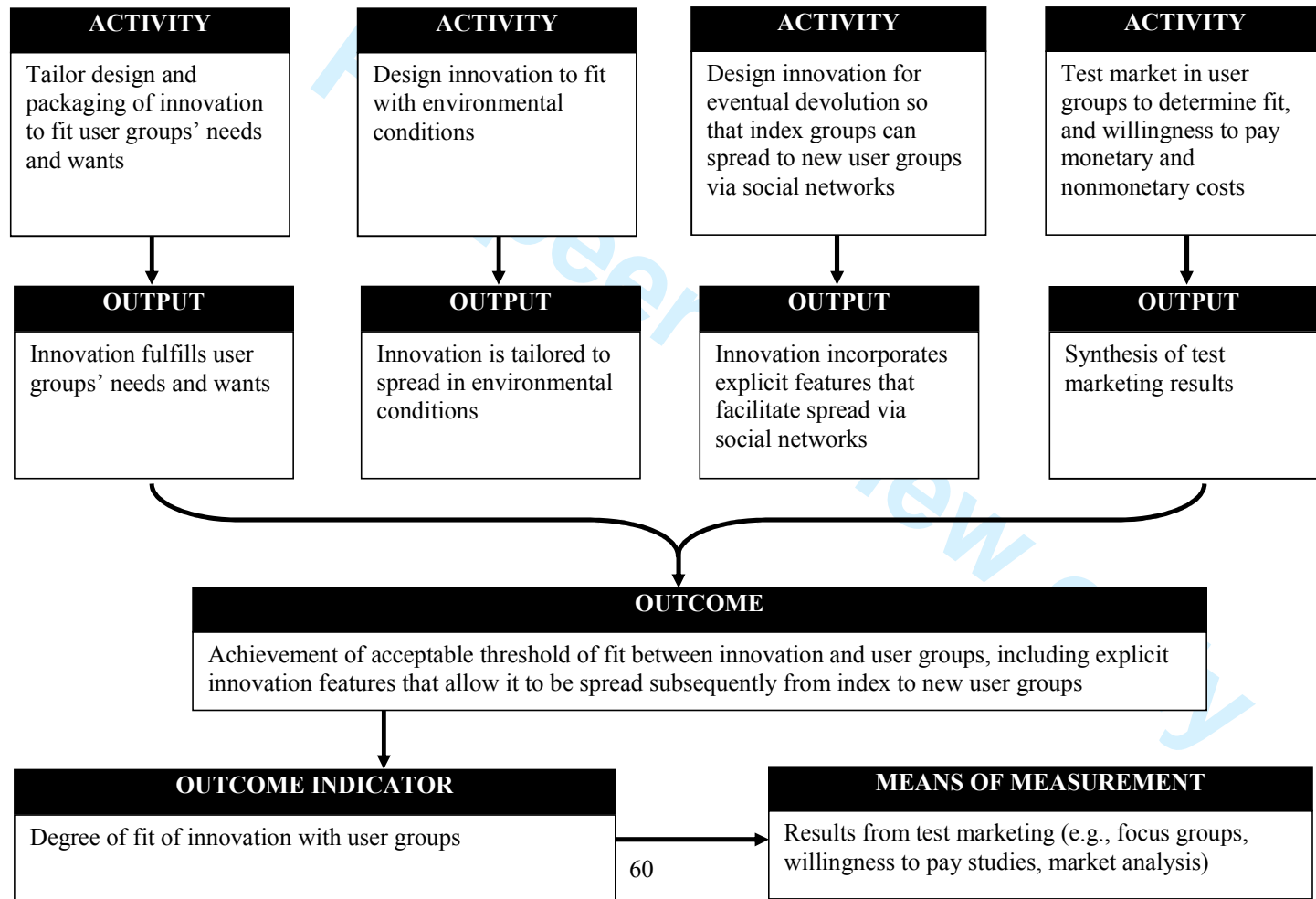


Figure A2. Innovate component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement



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Figure A3. Develop component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement

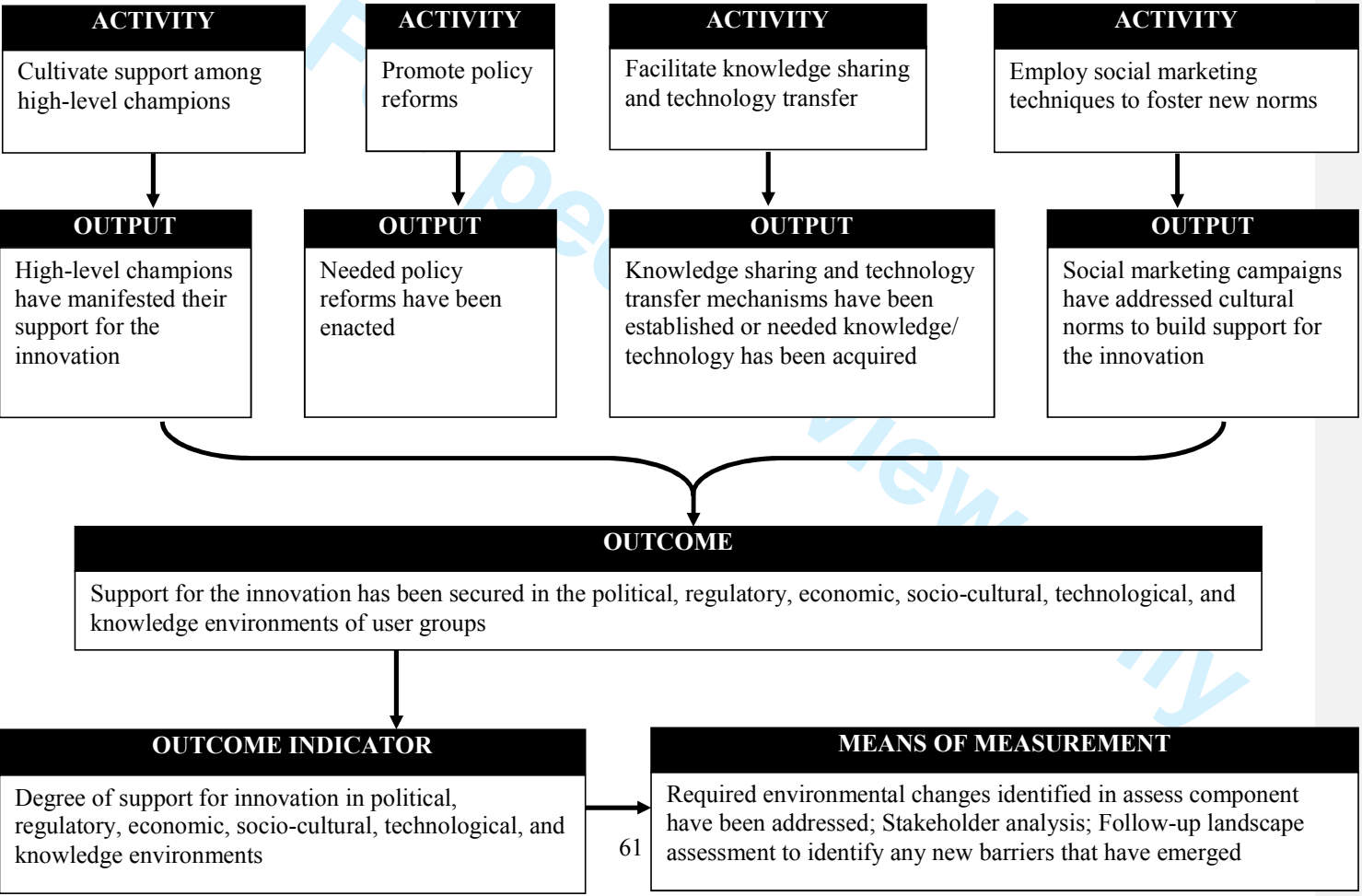
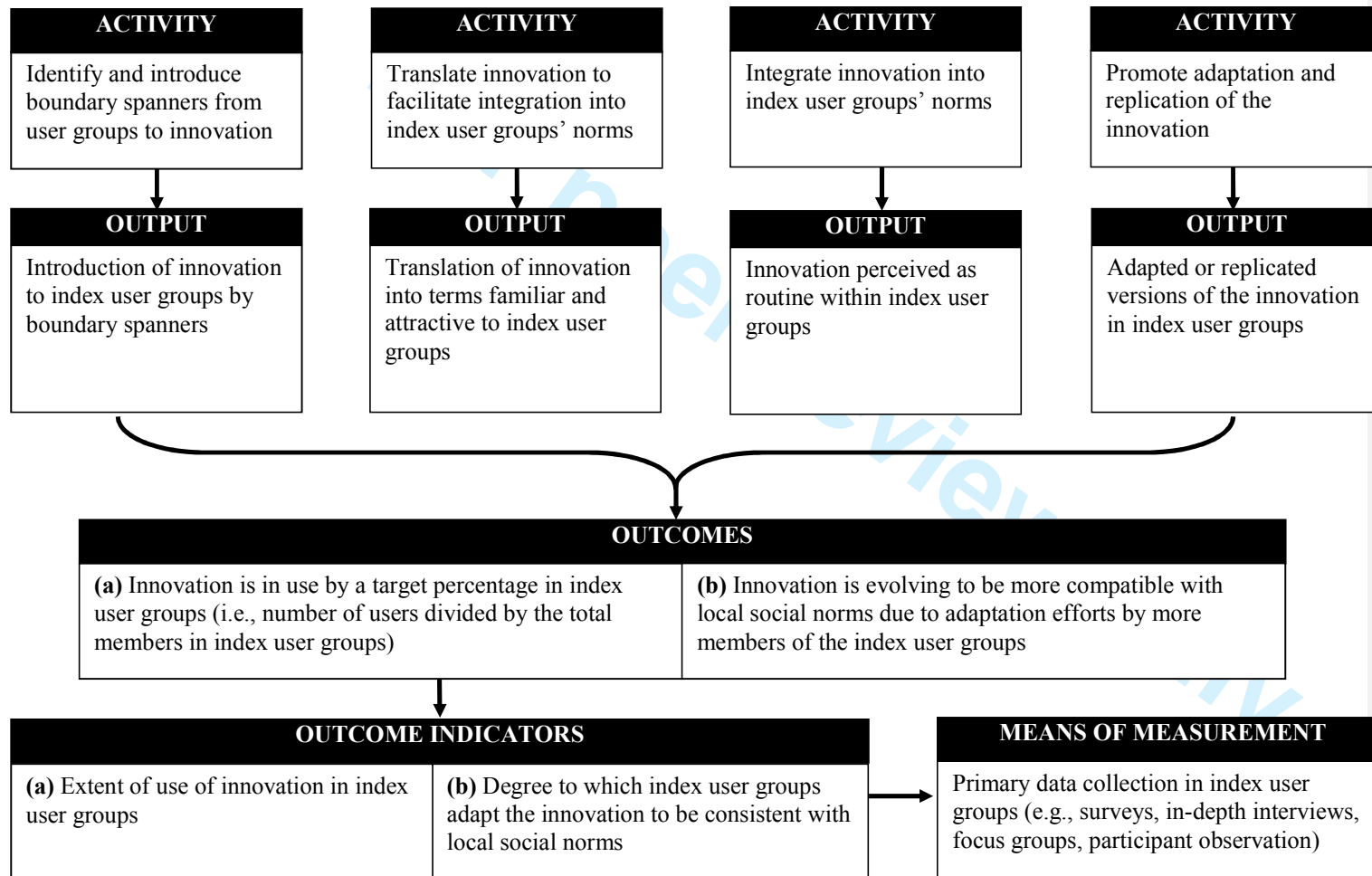
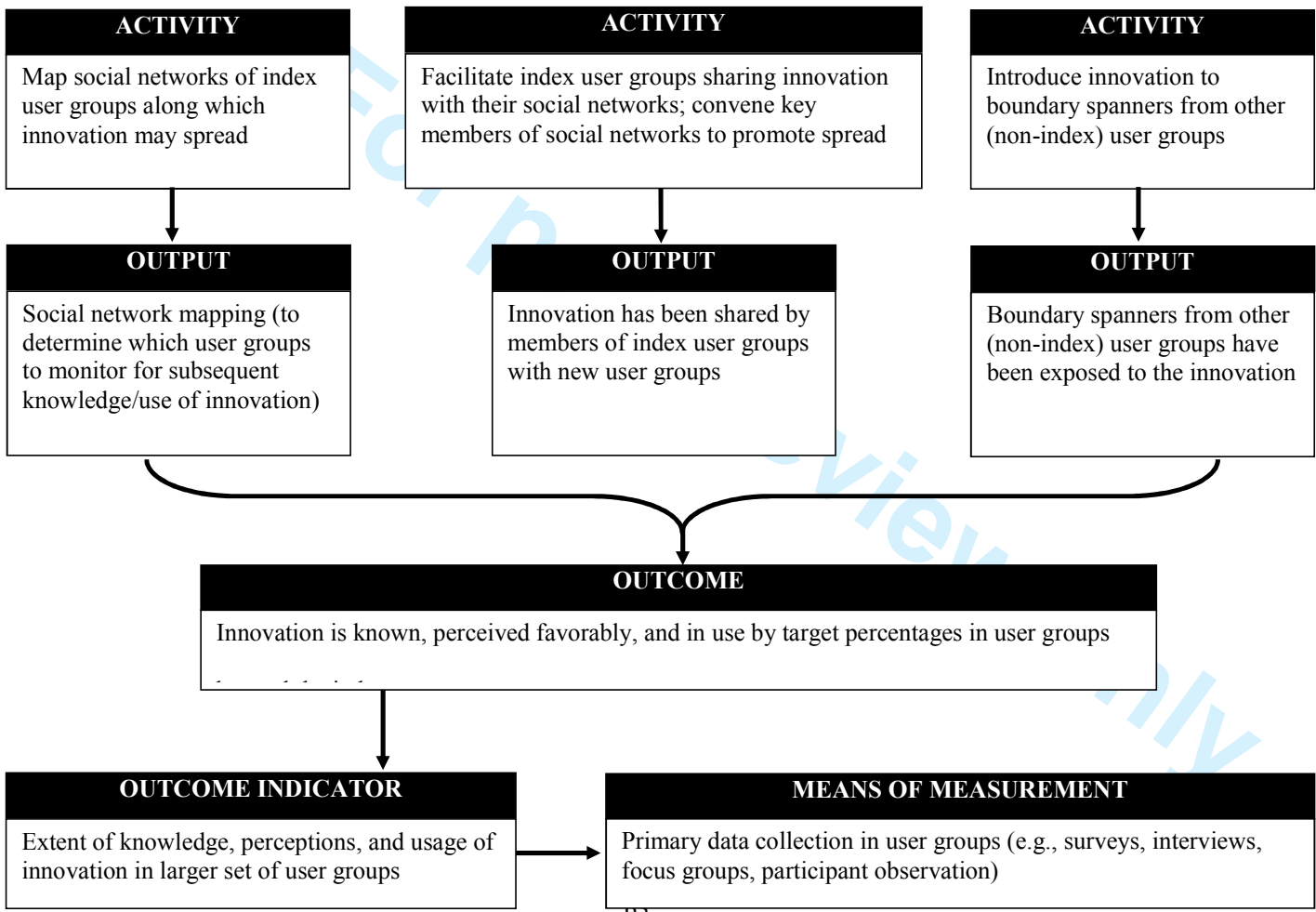


Figure A4. Engage component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement



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Figure A5. Devolve component: Flowchart of activities, outputs, outcomes, indicators, and means of measurement



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For peer review only

