HEALTH POLICY

Rethinking how development assistance for health can catalyse progress on primary health care

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TK, GY, SD, KKM, JL, CL, MMD, OO, PP, CS, and AT were all involved in the initial conceptualization of the analysis. TK, SD, and GY developed the prioritization approach. KKM and AT conducted the literature review, synthesis, and categorization of primary health care interventions. MMD, OO, and AZ conducted the modeling of costs. YA, LA, PB, PJG, DJ, HR, RN, AO, SR, KSR, DS, and BT were members of an international expert advisory group that ranked and prioritized interventions. TK and GY wrote the first draft of the paper, and all authors then reviewed and edited subsequent drafts. GY led the revision process after peer review.

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Abstract

Global campaigns to control HIV, tuberculosis, malaria, and vaccine-preventable illnesses showed that it is possible to achieve large-scale impact by using additional international financing to support selected, evidence-based, high-impact investment areas and to catalyze domestic resource mobilization. Building on this paradigm, we make the case for targeting additional international funding for selected high impact investments in primary health care. We have identified and costed a set of concrete, evidence-based investments that donors could support, which would be expected to have major impacts at an affordable cost. These investments are in (i) individuals and communities empowered to engage in health decision-making, (ii) a new model of people-centered primary care, and (iii) next generation community health workers. These three areas would be supported by strengthening two cross-cutting

elements of national systems. The first is the digital tools and data that support facility, districts and national managers to improve processes, quality of care and accountability across primary health care. The second is the educational, training, and supervisory systems needed to improve the quality of care. We estimate that with an additional international investment of between US$1.87 billion in a low-investment scenario and US$3.85 billion in a high-investment scenario annually over the next three years, the international community could support the scale-up of these evidence-based package of investments in the 59 low- and middle-income countries that are eligible for external financing from the World Bank Group's International Development Association.

Introduction

Strengthening primary health care (PHC) is the cornerstone of achieving universal health coverage.[1] Integrating core public health functions into PHC-based systems will also be critical for pandemic preparedness and building resilient health systems that can cope with the health effects of climate change and the rising burden of non-communicable diseases (NCDs).[2 3] Despite these benefits, investing in PHC has not been a priority for many low- and middle-income countries (LMICs) or donors. Stenberg and colleagues estimate that an additional $48 per capita needs to be spent annually on core elements of PHC,[4] which would represent nearly a trebling of the current PHC expenditure in low-income countries.[5]

The Lancet Global Health Commission on Financing PHC argued that, for long-term sustainability, most of this financing will need to come from domestic sources—particularly public financing.[6] However, there remains an important role for targeting additional development assistance for health (DAH) towards selected high impact investments in PHC. Just as DAH has played a major role in improving health outcomes related to HIV, tuberculosis, malaria, and vaccine-preventable illnesses, the paradigm of using external financing to make evidence-based investments coupled with a focus on measurable results could help to transform PHC-based health systems in LMICs. While DAH risks distorting national priorities and siloing health investments, it can play a beneficial role beyond its monetary value. When based on recognized global priorities, DAH can generate attention to an issue and propel a policy process aimed at tackling that issue.[7]

It is true that most DAH is already targeted at interventions delivered in primary rather than secondary or tertiary settings. However, most of this external financing for PHC has been for prevention and treatment of single diseases, often through vertical programs outside government budgeting processes.[8] The growing political momentum behind comprehensive PHC has not been matched by increased DAH for integrated, PHC-based health systems. The reasons for this include the perception that PHC is hard to define and measure, the concern that the donor price tag to shift the needle on PHC is impossibly large, and a sense that efforts to address the underlying challenges of weak health systems have not yielded many results.[9]

In this article, we challenge these perceptions by showing that it is possible to define a set of concrete, measurable investments in PHC that are amenable to donor financing and can catalyze transformational progress in LMICs for a modest price tag. While PHC can be defined in many

ways,[10] we use the approach adopted by the World Health Organization and UNICEF that identifies three main components of PHC: empowered people and communities, integrated health services with an emphasis on primary care and public health functions, and multisectoral policy and action.[11] We concentrate on the first two of these because they have typically been amenable to DAH, unlike multisectoral policy and action.

A prioritized package of investments to accelerate progress on PHC

We used a five-step process to identify and cost a set of concrete evidence-based investments that donors could support that would be expected to have major impacts at an affordable cost. The web appendix shows the detailed methods.

First, from a literature review, we identified a long list of 131 PHC approaches (the search strategy is in the web appendix). Second, to facilitate prioritization, we grouped the 131 approaches into 22 investment areas (Table 1). Third, we developed criteria to prioritize these investment areas, including areas that were likely to be transformational, promote equity, and contribute to building resilience, and the extent to which they were suited to donor financing. Fourth, an international expert working group of 13 academics and practitioners from eight countries, including LMICs, refined these criteria and then used them to prioritize an interconnected package of approaches. The experts were selected based on their knowledge and experience of PHC, aiming for gender and geographic diversity. They prioritized interventions through multiple rounds of a ranking exercise. The final package was organized into three interconnected investment areas (Table 2). Finally, we estimated the donor financing required to catalyze scale up of this package in 74 LMICs: the 59 countries eligible for financing from the World Bank's International Development Association (IDA) plus the 15 so-called "blend countries" that are eligible for external financing from both IDA and the World Bank Group's International Bank for Reconstruction and Development.

We estimated the costs of the three interconnected, prioritized investment areas, plus cross-cutting systems support to improve data and health worker education, using publicly available data sources. We combined top-down and bottom-up costing approaches to arrive at reasonable incremental cost estimates for each catalytic category. Two investment scenarios were modelled: (i) a low-investment scenario that included a minimum set of interventions needed to catalyze PHC improvement, and (ii) a high-investment scenario that included additional interventions over and above those in the low-investment scenario. Table 3 shows the costing modules and cost components for each of the different investment areas under the two different scenarios. We adopted a donor's perspective in line with the assumption that the costs estimated represent costs that donors will be willing to bear to catalyze PHC improvement in focus countries.

Through this process, we identified three interconnected investment areas that together represent a means by which donors could contribute to systemic change: (i) individuals and communities empowered to engage in health decision-making, (ii) a new model of people-centered primary care, and (iii) next generation community health workers (CHWs) (Table 2). These three areas would be supported by strengthening two cross-cutting elements of national

systems: digital tools and data that support facility, districts, and national managers to improve processes, quality of care, and accountability across PHC; and the educational, training, and supervisory systems needed to improve the quality of care. Figure 1 shows a theory of change for how investing in these three investment areas and supporting two cross-cutting systems elements could transform PHC delivery and improve health outcomes.

This package would not be implemented in a one-size-fits-all manner. The design of a prioritized PHC investment package would always need to be led and owned by countries, based on local data and needs. Nevertheless, we believe that the prioritized set of investments defined in this paper is a valuable starting point for understanding how additional DAH could help transform PHC.

Implementing this package would face multiple challenges. First, many of the approaches in the package are digital—thus, the challenges related to connectivity and digital literacy, particularly in more remote areas and among older populations, must be tackled for them to deliver impact. Second, trained human resources are critical to the delivery of these investments, yet longstanding challenges related to the health workforce have only worsened as a result of the COVID-19 pandemic. Third, financing for these investments should be provided in ways that strengthen national ownership and systems rather than in a vertical manner, as has sometimes been the case for DAH. Over the long term there should be a sustainable plan to transition from DAH to domestic financing; however, as HIV/AIDS has shown, it is important not to let fears about sustainability stand in the way of committing DAH that can save lives today.[12]

Individuals and communities empowered to engage in health decision-making

Empowerment of communities and individuals to become more active participants in the PHC system can have large impacts on health outcomes. For example, women's participatory learning and action groups during pregnancy could save an estimated 283,000 newborns and over 36,600 mothers every year if implemented in rural areas of 74 low- and middle-income countries.[13] When communities and individuals have access to learning, knowledge, and information, PHC systems place the patient at the center, and patients are empowered with digital tools to support self-testing and self-management, they shift from being passive consumers to co-creators of health prevention and care. Such digital tools should be connected to an infrastructure that would allow for follow up in the event that a health condition progresses, e.g., self-testing for human papillomavirus (HPV) should be linked to appropriate cervical cancer treatment services. There is growing interest in harnessing the knowledge and experiences of the community in co-creating, co-producing, and co-designing PHC interventions.[14]

However, to date there has been little dedicated investment in supporting communities and individuals in this way to become actively involved in decision-making within the health system. The small amount of investment has been piecemeal and accountability for such investments has typically been upwards—to central governments and donors—rather than downwards to people and communities.

PHC in LMICs could be radically transformed by strategic, interlinked international investments to engage communities and individuals through community empowerment efforts and through self-management and self-testing approaches.

A dedicated "joined up" approach to empowering communities

While donors have funded some community engagement, the full power of community coalition building, participatory learning and action groups, and patient education and outreach activities has not yet been unleashed. Coalitions that link health workers with communities, particularly when vulnerable populations are involved, can improve individual health outcomes and behaviors and also population-wide PHC delivery systems. Such coalition-driven community engagement strategies have been shown to have positive effects across a wide range of health issues, including HIV risk behavior, immunization uptake, and breastfeeding behavior.[15] Participatory groups that mobilize and engage communities in policy, organizational change, public health campaigns, and shaping and preparing information for patients can all have positive impacts (Panel 1).[16]

Self-testing and self-management

New technologies are empowering individuals to play active roles in managing their own health. Self-testing for HPV, for example, has been shown to be acceptable to both women and health workers and effective at getting to communities who live far from health facilities and who are rarely reached by health workers.[17] HIV self-tests allow people to obtain their own HIV status from an oral swab or blood sample; some of these people would not have sought testing at a health facility due to stigma linked with HIV.[18]

A digital revolution is underway that puts power in the hands of individuals to take more control over their own health but the fruits of this revolution have not yet reached LMICs at scale, with the exception of India. Over the past 10-15 years, India has invested in building and scaling up a digital identification program, Aadhaar, that now covers over 1.2 billion people. Aadhar enabled the government to build a platform, the Cowin platform (https://www.cowin.gov.in/), that helped in planning and delivering over 1.2 billion COVID-19 vaccine doses.

The rapid rise in the number of people who own mobile phones creates an opportunity to use mobile phone apps to facilitate self-management of long-term illnesses, curb NCD risk factors, enable easier access to pooled payment schemes (e.g., regional or national health insurance), and provide information on demand for a range of conditions, including for maternal healthcare (Panel 2). Studies have shown improved health outcomes and self-management in people with diabetes or high blood pressure from using such apps.[19] Nevertheless, in many parts of the world, connectivity is limited. Investments in connectivity need to be complemented by resources that address broader access questions including affordability, building digital literacy, and equity. With the proliferation of artificial intelligence (AI) and machine-learning solutions, investing in digital public infrastructure could help maximize the impact of AI for LMICs and minimize the risks of widening existing equity gaps.

A new model of people-centered primary care

The fastest route to improving health outcomes is by increasing the availability and quality of evidence-based, high-impact interventions.[1] Yet, many countries have hit plateaus in the coverage of these interventions as a result of ineffective and inefficient service delivery systems.

Too often, care is siloed, with external resources used to hire health workers to focus on specific diseases with laboratory facilities only equipped to diagnose the conditions that receive dedicated support. The model of facilities relying on sick patients presenting at them is inefficient and inequitable. It ignores technological advances that open up new ways of reaching patients and the successful experiences of several countries in moving to models that engage entire communities.

New models of care that integrate multiple vertical health services around community-based, coordinated, continuous, comprehensive, compassionate, first-contact PHC services are needed to overcome these challenges. For example, Iran uses primary care kiosks called "health houses" connected to larger primary care centers.[20] Rwanda has established health posts that are within 30 minutes' walking distance of all members of the population.[21] Brazil's community CHWs have "played a pivotal role in primary care," with each CHW assigned up to 150 families.[22]

Large-scale shifts require political leadership and a sizeable commitment of resources to design, test, and ultimately scale up a new model. Many LMICs have shown leadership in championing some of these approaches, but even visionary leaders often lack the flexible financing required to drive this kind of change. The provision of that kind of financing is a perfect role for DAH.

Digital diagnostic and clinical decision support tools

Many conditions can be handled by establishing skilled multidisciplinary teams at a PHC facility and the infrastructure needed for PHC delivery, onto which digital technology can be layered. Inevitably the skills of these teams will reach their limits, meaning patients need to visit secondary or tertiary facilities, which is often more challenging for people with lower incomes or in more rural settings. Rapid technological advances and new approaches have opened a window of opportunity to rethink the way care is delivered to populations model. Machine learning algorithms are being used for diagnostic imaging in high-income countries and could be revolutionary in settings with limited access to specialists,[23] but this technology has barely been deployed in LMICs. For outbreak control, rapid diagnostic tests for various pathogens could be used by CHWs connected to central laboratories via digital apps. PHC centers can establish information technology kiosks that connect patients with specialists located in distant cities who can offer telemedicine consultations or that enable the care teams to get second opinions. Simple decision support tools can help optimize treatment regimens for chronic conditions and provide alerts on side effects.

Multidisciplinary care teams

Siloed service delivery has been important in addressing emergency situations, particularly in the context of the rapid spread of HIV.[24] However, integrated approaches are generally more effective and efficient in handling the rising complexity of care created by ageing of the population and the shifting burden of disease, such as multimorbidity tied to the double burden of infections and NCDs.[25] Integrated approaches are also needed to build systems able to withstand shocks from pandemics and other threats, such as climate change.

The center of an integrated approach is a service delivery team that brings together primary care doctors, nurses, and CHWs, supported where feasible by lab technicians, pharmacists, midwives, and other specialists (e.g., mental health professionals). This team serves as the first point of contact with the health system. Brazil's Family Health Teams model has been a cost-effective way to improve PHC service coverage and health outcomes, particularly in poorer regions (Panel 3).

New approaches to reaching people

Too many health systems are still organized around an inefficient, ineffective, and inequitable model of relying on individuals to show up at a health facility when they become sick enough to seek care. This means that some people—particularly poorer people—wait too long to access services, which often increases the costs of that care because simpler solutions are no longer feasible and outcomes are worse. Others show up more frequently than necessary, increasing the burden on the system.

There are several promising alternatives. COVID-19 has accelerated progress in the use of telehealth. Services can be shifted from static facilities to outposts in communities as a way to bring care to where people are rather than waiting for them to travel to larger facilities. Several countries have improved health outcomes by proactively identifying all people in a given area and assigning them to a care team responsible for looking after their health, an approach known as empanelment (panel 4).[26] Empanelment can improve care team accountability for the delivery of services that maximize the health of the full population of an area, rather than just the subset that shows up to access care. It promotes equity because those who cannot afford to access care are identified for proactive follow-up if they are not accessing services. The model also strengthens key public health functions, including surveillance and the provision of information and behavior change messaging.[27]

Next generation community health workers

Several LMICs have expanded CHW programs in recent years, which was instrumental in improving health outcomes and in linking PHC with secondary and tertiary care.[28] Despite these successful approaches, in many countries CHW programs are small-scale and reliant on volunteers who receive no or minimal pay and little training. Too often, CHWs are insufficiently tied with PHC facilities and so lack supportive supervision. Some countries have different CHW programs addressing different diseases, leading to fragmented, inefficient care and insufficient provision of public health services. And the digital revolution has bypassed far too many CHW programs, so they do not benefit from access to decision-support tools and do not feed data into national monitoring systems.[29]

Investments in CHW programs are not yet commensurate with the value they offer. The idea of expanding CHW programs—particularly with paid staff rather than volunteers—may be challenging at a time when the fiscal space in many countries is under pressure. However, the long-run benefits of such expansion, including the eventual economic returns from better health, are well documented.[30] There is a strong case for increasing DAH to help fund large-scale CHW programs, with workers who are paid, trained, and technology-enabled and who provide comprehensive, integrated services. CHWs are also well placed to help link the health sector with other sectors that influence health, such as sanitation and nutrition.

Large-scale programs that employ paid, trained CHWs

The WHO has long recognized that CHWs should be remunerated for their work and has established benchmarks for the appropriate density of CHWs.[31] Reaching these standards will require large-scale investments to cover CHW recruitment, payment, and training (Panel 5). These CHWs would provide community case management services and links to facilities when individuals require more sophisticated care than can be delivered in homes. They could also work with other medical personnel to deliver care in innovative settings such as community-based kiosks. Adequately staffing CHW programs would also enable them to serve as the first line of alert in detecting emerging pathogens and unusual disease patterns.

Making sure every CHW program is technology-enabled

CHWs are often treated as second-class members of the health profession and not provided with the equipment and supplies that other health workers benefit from, as seen during the COVID-19 pandemic when many CHWs were not provided with personal protective equipment.[32] This mindset limited the effectiveness of CHW programs well before the pandemic because it meant that many of these programs were not taking advantage of the possibilities presented by digital technologies.

Technological advances and drops in price mean that efficiencies of CHWs being provided with a smartphone, and airtime to use it and the means to charge it, can be leveraged to benefit community health in three particular ways. First, the quality of care delivered by CHWs would improve by being able to draw on digital decision-support tools that can assist with diagnosis and identify when a patient needs referral to a health facility. Second, it would enable rapid feedback and supportive supervision that is currently not possible in most CHW programs (Panel 6). Third, data generated by CHWs could flow into national databases in real time, improving the ability of decisionmakers at all levels to base their plans on the most recent data, including spotting data signals that could help identify emerging pathogens.[33]

However, expanding the CHW service package will require increasing the number of CHWs to established density standards.[11] Support will be needed to define competencies and recruit, train, and equip this expanded cadre. Smartphone provision needs to be coupled with training of CHWs to use digital technologies.[34] [35]

Offering a comprehensive and integrated package

The expansion of CHW programs enables an important evolution from models in which CHWs focus mostly on disease-specific work or pregnant women to ones in which they engage with everyone in their communities to provide services tailored to community needs. This shift would enable active case-finding, which can connect people with health services early in the course of a disease, when treatment is often more effective. CHWs can also support access to resources that have a direct effect on health status, such as food and housing. The reach of CHW programs means they are ideally suited to playing a central role in shifting the focus of health services from dealing with people who are sick to promoting health and preventing illness (Panel 3).

Cross-cutting systems to improve data and education

The three investment areas described above will be more effective if complemented by strengthening (i) the data systems that monitor patients, staffing, and supplies and (ii) the systems aimed at improving quality of care through education, training, and supervision.

The COVID-19 pandemic highlighted the importance of systems that can produce accurate data in real-time. Concerns about the quality of these systems—including such basic elements as tracking the numbers of people being born and dying—fed uncertainty about the extent and severity of the pandemic in many LMICs. As vaccine roll out got underway, many countries struggled to identify healthcare workers for vaccination because they did not have accurate data about their health workforce. The need to keep track of scarce vaccine supplies also called attention to the value of robust logistics management information systems.

Donor support for these areas has been hampered by fragmentation and questions around sustainability. Recent efforts have started addressing this, such as donor support for health management information systems and civil registration and vital statistics systems.[36] Less attention has been paid to other systems that are important for service delivery, particularly electronic medical records systems, human resources information systems, and logistics management information systems. India is building a comprehensive integrated health observatory platform, which could be an exemplar for other countries.[37]

Alongside new investments in data systems, similar investments are needed to address quality of care, since expanded access to services needs to be matched with a focus on quality.[10] A number of the investment areas described above—particularly new models of care—can be important levers for improving the quality of care.

The costs to scale up the prioritized package

We estimate that with an additional international investment of US$1.87 billion in a low-investment scenario and US$3.85 billion in a high-investment scenario annually over the next three years, donors could support the scale-up of the above evidence-based package of investments in the 59 IDA-eligible countries. Increasing that amount to $2.79 billion in a low-investment scenario and US$5.75 billion in a high-investment scenario would allow the 15 “blend” countries to also be covered.[38] The web appendix shows the breakdown of these costs into different investment areas.

In the low-investment scenario, donor support is concentrated on getting these approaches on the path to scale, such as covering the costs of designing and launching new systems, training, and initial investments in equipment. The projected level of financing is aimed at pushing past the trap of donor-financed pilots: it would support 30% of the costs of reaching full population coverage of these approaches, as well as 100% of the costs of some key one-off expenditures (e.g., designing new software applications). The high-investment scenario would cover all of this plus a wider set of implementation costs, including some human resources costs and a more expansive set of capital costs. The financing would also enable these approaches to reach an additional 30% of the population in these countries. Table 4 gives further details of the differences between the low- and high-investment scenarios.

Conclusion

Global campaigns to control HIV, tuberculosis, malaria, and vaccine-preventable illnesses showed that it is possible to achieve large-scale impact by using additional external financing to support a limited number of evidence-based, high-impact investment areas and to catalyze domestic resource mobilization. We recognize that these efforts have required decades of investment, and many of them still have a long way to go to reach global disease control targets. Progress has also been set back by the COVID-19 pandemic.[39] Nevertheless, they have shown proof of principle that targeted donor financing can make important and outsized contributions to improving health.

Although domestic resources ultimately must be the primary source of financing for these PHC approaches, in the short-term, DAH has a crucial role to play in supporting countries in strengthening PHC. A key rationale is that many of the investments needed are in areas such as digital technology that have significant start-up costs that may prove difficult to cover from domestic budgets impacted by COVID-19, inflationary pressures, and debt burdens. This will also benefit existing donor investments, as it will help tackle the bottlenecks that are increasingly recognized as at the heart of the challenges faced by donor-funded global health initiatives such as Gavi, the Vaccine Alliance, the Global Financing Facility, and the Global Fund to Fight AIDS, Tuberculosis and Malaria in their work to improve health outcomes. Increasing financing for PHC will also be critical to strengthening pandemic preparedness and response, which, as a recent WHO document put it, "must be built on a foundation of strong national health systems centred on primary health care."[40]

We have proposed an approach to international investments in PHC built on the proven paradigm of using donor resources catalytically. We identified a package of priority investments in PHC that are amenable to donor financing, can catalyze transformational change, and can be delivered for the reasonable price tag of US$1.9–US$3.8 billion per year in new DAH. The sharp rise in DAH during the COVID-19 pandemic has shown that there is budgetary room for donors to increase their financing when there is political will. The package would target empowering communities and individuals to engage in health decision-making, a new model of people-centered primary care, and next generation CHWs. In each of these, new technologies are creating promising opportunities to leapfrog traditional constraints and scale up the delivery of quality health services. In addition, it is vital to strengthen systems that aimed at improving quality of care through education, training, and supervision.

Countries worldwide—often with support from external partners—are already demonstrating what is possible with these approaches. The challenge has been that these efforts often remain small scale, which is likely to remain the case without a concerted push supported by international investments. Strengthening external support for PHC does not require the creation of a new funding structure. Instead, the global health community could use existing financing structures to invest in PHC more systematically. We believe the case for increased international investment in PHC is clear and compelling.

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Tables, Figures, and Panels

Table 1. Initial identification of 22 investment areas, organized using the WHO levers for PHC

WHO lever	Investment area	Example
Governance and policy frameworks	Governance arrangements to improve population health outcomes	Participatory learning or consumer involvement in policy and organizational decisions
	Public health policy to improve overall health	Subsidies for fruits and vegetables to improve healthy eating and nutritional outcomes
Engagement of communities and other stakeholders	Community or patient engagement in health decision making	Community coalitions to develop broad social and health system strategies to reduce disparities and improve health status
	Health promotion to improve basic health care	Road safety public education and awareness campaigns to improve road safety
	Innovative technology and approaches to empower communities to take more control over their health (self-care)	Public communication through social media platforms, online search engines, chat-bots
Models of care	New care delivery models to improve patient case finding	Active case-finding for identifying undiagnosed disease in the community
	New care delivery models to increase access	Community-based HIV services to surmount stigma (e.g., service is directly offered by community member instead of through a referral to a health center)
	Public health services to improve overall health	Promotion of handwashing by community health workers
	Public health interventions to improve pandemic preparedness/response	Increasing ventilation in buildings or homes (e.g., by enhancing air

		changes per hour (ACH)) to reduce transmission risk
Primary health care workforce	Financial and non-financial incentives for healthcare workforce	Increasing medical provider coverage in rural areas through requirements and/or incentivization (financing or in-kind benefits such as housing)
	Task shifting (particularly to community health workers) to improve health access and outcomes	Task-shifting to community health workers or other moderately skilled health workers (e.g., for health promotion, basic curative services, chronic disease management, and/or skilled deliveries)
Medicines and other health products	Strengthening performance of supply chains	Improving access to contraceptives via automated distribution systems (vending machines)
Engagement with private providers	Private sector approaches to improve quality and service delivery	Contracting delivery to private sector providers to reduce out of pocket spending, improve health utilization, and service delivery
Purchasing and payment systems	Supply-side approaches to improve health financing architecture	Changing national policies to remove user fees at primary care level
Digital technologies for health	Digital health to improve patient tracking and referrals	Mobile-based patient tracking to decrease loss to follow up and increase referral uptake
	Digital health to improve patient treatment adherence	Biometric based patient tracking and identification to improve adherence to care and health record management
	Digital health to support provider decision making and care practices	Interventions to improve antibiotic prescribing practices
	Digital health for pandemic preparedness and response	Digital epidemiological surveillance with machine learning, survey apps, websites, data extraction and visualization
	Data systems and use to improve quality of health system	Establishing clinical information systems to collect longitudinal data to improve quality and safety

	Telehealth to improve access to healthcare	Clinical care through telehealth/teleconferencing that connects providers at primary care level with specialists
Systems to improve quality of care	Financial and non-financial incentives to influence patient behaviors	Cash transfers (conditional or unconditional) to reduce structural risk factors
	Training, education, and other management techniques to improve provider quality	Routine health information system for health system management, governance, accountability, planning, policy making, surveillance, and quality improvement

Figure 1. Theory of change for how the package of donor investments will drive impact

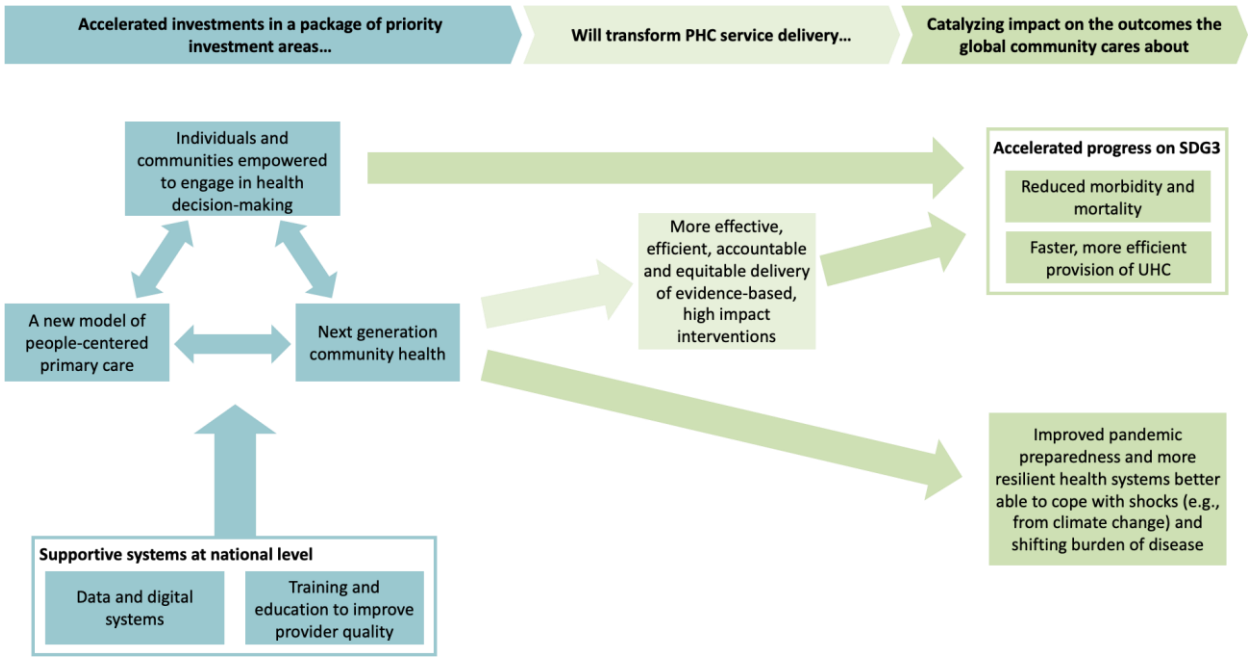

Table 2. A prioritized package of thee investment areas

Investment area	Current status in many LMICs	Status that could be achieved through additional investment	Examples of LMICs that have made investments in this direction
Next generation community health workers	Sub-scale community health worker programs that are overly reliant on unpaid volunteers with limited training, inadequately tied to health facilities, not connected to digital resources, and focused on vertical disease control efforts	Large-scale CHW programs with a paid, trained workforce that is integrated into care teams based at health facilities and responsible for a defined population, enabled by digital tools, and offering a wide range of services (including case management for both communicable and non-communicable diseases, active case-finding, and public health services, including surveillance)	Bangladesh, Brazil, Ethiopia, India, Indonesia, Iran, Nepal
Individuals and communities empowered to engage in health decision-making	Limited, fragmented investment in ensuring that communities are actively involved in decision-making within the health system, with accountability typically flowing up (to national governments and donors) rather than to the people most impacted	Interlinked investments that support community empowerment, including through direct financing of capacity building, supportive digital tools, publication of data, and demand-side financing	India, Rwanda, South Africa
A new model of people-centered primary care	Uncoordinated, siloed care skewed by incentives to focus on particular diseases,	Multidisciplinary teams composed of general practitioners, nurses, and CHWs (and, where	Brazil, Costa Rica, Iran, Rwanda

	based on a model of providing care to those patients who are able to show up at facilities	possible others such as pharmacists and counselors) that ensure care continuity to a defined population, facilitated by digital tools that offer decision support (including by connecting them with specialists at higher-level facilities)	

Abbreviations: CHW, community health worker

Panel 1: Community empowerment in action: women's participatory learning and action groups

Participatory learning and action groups for women can increase care-seeking for antenatal care and institutional delivery, as well as improving care practices for mothers and newborns.

A systematic review and meta-analysis of 7 randomized control trials of the role of such groups in maternal and newborn health in four countries (Bangladesh, India, Malawi, and Nepal) found evidence of impressive results for a relatively low-cost investment. Based on four studies where more than 30% of pregnant woman participated, exposure to women's groups is associated with:

- A 49% reduction in maternal mortality;
- A 33% reduction in neonatal mortality;
- Research has also shown that the intervention is cost-effective.[18]

Panel 2: Delivering an integrated vision: MomConnect South Africa: A mobile health tool enabling health promotion, healthcare data collection and user feedback on healthcare facilities

There are important synergies across the three investment areas described above, with the different elements designed to reinforce each other. A good example of how a technology platform can contribute to delivering comprehensive primary health care is the MomConnect program

MomConnect is a mobile health program run by the National Department of Health in South Africa. Designed to improve antenatal and maternal health in South Africa, it has rapidly scaled into one of the world's largest mhealth tools. Pregnant women register themselves or are registered through an initial antenatal appointment at a healthcare facility into a national universal pregnancy registry. During their pregnancy and until the child is born, they receive weekly SMS messages providing timely information on safe and healthy pregnancies and childrearing, including information on nutrition, warning signs of fetal development and sensitive topics such as domestic abuse awareness. Through an interactive helpdesk, woman can ask questions on antenatal, maternal and child health, as well as provide feedback on the healthcare facilities that they are using.

A companion service, NurseConnect, provides nurses in more than 3,000 facilities across the country with a one-stop-shop to access information on common conditions, interact with the National Department of Health, and receive emotional support and encouragement.[41]

- Voluntarily used by 60% of pregnant women receiving formal antenatal care in South Africa;[42]
- Users felt empowered by the messages and reported having increased understanding of how to promote maternal and child health;[43]
- User data on the quality of care at health facilities helps to identify quality issues in healthcare facilities;[51]
- Health data collection is facilitated through the creation of a master patient index that can be integrated into an electronic medical system.[44]

Panel 3: Multi-disciplinary care teams in action: Brazil's Family Health Teams

Brazil's Family Health Teams (FHTs) have proven to be a cost-effective way to improve PHC service coverage and health outcomes, particularly in poorer regions. These teams provide comprehensive and continuous community-based PHC to a defined group of patients. Through active health promotion, education, surveillance, and control of neglected tropical diseases, they focus on prevention rather than treatment of disease. Each team consists of a physician, nurse, nurse technician, and four to six full-time community health agents, as well as other health workers including oral health workers, physiotherapists, and managers. FHTs are supported by PHC support teams who provide additional care to empaneled populations, including through input from psychologists, obstetricians, and public health workers. FHTs were set up in 1994 as

part of Brazil's Family Health Program and by 2014 covered 64% of the population.[45] They are associated with a range of improved outcomes including:

- Reductions in cardiovascular disease morbidity and mortality;[46]
- Reductions in infant mortality;[47]
- Reductions in pediatric and adult hospital admissions as a result of improved primary care;[48]
- Increases in vaccine coverage rates.[49]

Brazil's Family Health Program was funded through an innovative finance mechanism called Piso da Atenção Básica (the Floor for Basic Care), which channeled federal resources to municipalities to deliver services. In a case study of this financing mechanism, The Lancet Global Health Commission on Financing Primary Health Care noted that it had been "a stable source of funding for PHC for more than 20 years."[50] However, the Bolsonaro government introduced a policy to replace the Floor for Basic Care with a risk-adjusted capitation mechanism.[46]

Panel 4: Empanelment: a critical component of Costa Rica's primary health care reforms

In 1994, Costa Rica reformed its primary health care system through establishing basic integrated health care teams, known as the Equipo Básico de Atención Integral de Salud (EBAIS, or basic integrated health care team) model.[51] A case study of the reforms, by Pesec and colleagues, notes that these were aimed at achieving "first-contact access, coordination, continuity, and comprehensiveness." In addition to integrating public health services with PHC, establishing multi-disciplinary teams, and improving health systems measurement and data, a fourth key component was geographic empanelment. Every EBAIS team serves a geographically empaneled population. Each team has a panel of about 4,500 patients. The first teams were established "in the most medically underserved areas, so formation of the teams generally moved from the most rural parts of the country to the capital, thereby promoting equity."

Panel 5: Large-scale CHW programs in action: Ethiopia's health extension workers

Ethiopia's health extension workers (HEWs) have played a critical role in improving health outcomes and overcoming shortages of health workers since the program was launched in 2003. HEWs are women selected from the local population by representatives of the community and district. Following a 12-month training program, they become salaried government officials and are assigned in pairs to "kebeles" (neighborhoods). HEWs work closely with communities, educating and providing care to support sanitation, antenatal care, postnatal care, immunizations, family planning and malaria diagnosis and treatment. Their introduction, in combination with the wider health extension program and other comprehensive strategies to support the health system, was instrumental in supporting Ethiopia to achieve the health-related Millennium Development Goals. HEWs played a role in achieving:

- A 67% reduction in the under-five mortality rate;
- A 71% decline in the maternal mortality ratio;
- A 90% decline in new HIV infections;
- A 73% decrease in malaria-related deaths;
- More than 50% decrease in TB mortality.[52]

Panel 6: Digitally-enabled CHWs in action: CHWs delivering antenatal care in Nepal

Medic Mobile, a mobile phone-based health monitoring solution, was introduced in Nepal in 2013 to support CHWs to deliver the full cycle of antenatal care (ANC) to expectant mothers. CHWs were given mobile phones and trained to use standardized SMS texts to register maternal health information and flag potentially dangerous signs during pregnancy. This information is used to automatically generate SMS alerts to CHWs to remind them to follow up with mothers for ANC consultations and enables CHW supervisors to monitor CHW activity. Medic Mobile was designed for use by CHWs with low literacy, showing that even simple digital tools can improve service delivery. By 2017, the program had been scaled in Nepal and launched in 22 other countries, supporting almost 14,000 CHWs. Pilot evaluation suggested that the tool:

- Made it easier for CHWs to keep track of the expectant mothers who were under their care;
- Increased the frequency of CHW contact with expectant mothers and newborns, and the timely management of complicated cases.[53]

Table 3. Costing the catalytic approaches: costing modules, investment scenarios, and cost components

Catalytic approach	Costing module description	Investment scenarios and cost components
Next generation community health	Annual cost of providing community-based care through ICT-enabled CHWs per 1,000,000 population.	Low-investment scenario: • CHW trainings, supplies (including backpacks, drugs and RDTs; costs of IT support included under data and digital systems), management and supervision. High-investment scenario: • Low-investment program plus the following: CHW salaries, and overhead costs.
Individuals and communities empowered to engage in health decision-making	Element 1: Strengthening community and patient engagement in health decision making: Annual cost of providing community participatory learning and action cycles per 1,000,000 adult female population aged 15-49 years.	Low-investment scenario: • System set-up costs (e.g., staff recruitment and training, securing community approval and adapting intervention delivery methods, content and materials to the local context) • Capital costs (e.g., vehicles, IT and office equipment). High-investment scenario: • Low-cost program plus the following: materials costs, implementation costs, other recurrent costs and staff salaries (program staff, group facilitators, supervisors).
	Element 2: Empowering patients to look after their own health: Annual cost	Low-investment scenario: • System set-up (e.g., training for start-up, demand generation, etc.) • Capital costs (e.g., building and storage, equipment, vehicles, etc.). High-investment scenario:

	of providing disease-specific self-diagnostic services per 1,000,000 population.	• Low-investment scenario plus the following: costs of self-testing kits, and distribution costs. No personnel salaries.
New models of patient-centered primary care	Cost of supporting reforms to introduce new care models	Low-investment scenario: • Digital diagnostics and decision support: Costs related to the development and running of digital tools (clinical decision-support tool, IT kiosks in primary care facilities), including training. • Empanelment: TA to design system (including IT system design). • Multidisciplinary teams: TA to design system reforms; training; operational research around piloting it. High-investment scenario: • Digital diagnostics and decision support: Low-cost scenario + costs for telehealth program. • Empanelment: Low-cost scenario + data collection to compile comprehensive database. Multidisciplinary teams: not applicable
Data and digital systems	Cost of implementing a digital health system per 1,000,000 population.	Low-investment scenario: • Set-up costs (e.g., standards development, development of platform, training), equipment costs (e.g., costs to digitalize health facilities and provide smartphone and data plans to CHWs). High-investment scenario: • Low-investment scenario plus the following: costs to maintain platform and institutionalize data use, other recurrent costs.
Training, education, and other management techniques to improve provider quality	Cost of setting up an e-learning platform for health workers	Low-investment scenario: • One-time set-up costs for an e-learning platform (includes standards development, platform development) and a MOOC. • Cost categories include: personnel, overhead, equipment and material, indirect costs, stakeholder cost High-investment scenario:

		• Low-investment scenario plus the following: demand generation, recurrent costs. (Cost of devices not included in any scenario [covered under data and digital systems])

Abbreviations: ICT, information and communication technology; CHW, community health worker; RDT, rapid diagnostic test; IT, information technology; TA, technical assistance; MOOC, massive open online course.

Table 4. Key differences between the low- and high-investment scenarios

Investment area	Low-investment scenario	High-investment scenario
A new model of people-centered primary care	Donors can catalyze progress by financing (i) development of decision support tools, (ii) tablets that frontline workers in primary care facilities need to benefit from these tools, (iii) provision of the technical assistance needed to redesign models of care and introduce the accompanying policy shifts, and (iv) research to identify what works and the barriers to scaling up.	A larger investment would cover the implementation costs associated with scaling up telehealth services to reach 30% of the population and the costs of data collection to facilitate empanelment.
Next generation community health	In this scenario, CHW programs could be expanded to cover 30% of the population with an enhanced package of services by financing 5 key areas: (i) technical assistance to support the planning needed to expand CHW programs, including the long-run fiscal implications; (ii) training to ensure that existing CHWs are equipped to deliver quality care in a comprehensive manner and that new CHWs are well-prepared for their roles; (iii) supplies so that all CHWs have a basic package of materials (e.g., basic medicines, rapid diagnostic kits); (iv) digital devices (i.e., smartphones or tablets, depending on national protocols) and the means to make optimal use of the devices (e.g., airtime, subscriptions to apps); and (v) the development and/or customization of digital decision-support tools for use by CHWs.	More significant financing would support the wage costs associated with expanding CHW programs to provide comprehensive coverage for 30% of the population.

Individuals and communities empowered to engage in health decision-making	This scenario would cover in each country the costs of (i) setting up a large-scale community empowerment program (e.g., participatory learning and action groups) to reach 30% of the target population (e.g., women of childbearing age), including training of community leaders on how to promote and facilitate community engagement, and facilitation, convening, and supplies costs; (ii) setting up a national self-testing program to reach 30% coverage, including training and demand generation costs; and (iii) the costs of developing a digital self-care tool (i.e., mobile apps).	A high-investment scenario would also cover the costs of procuring and distributing self-test kits for 30% of the population in each country.

Abbreviations: CHW, community health worker

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