Social innovations to increase health coverage: evidence from a crowdsourcing contest in Ghana

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ABSTRACT

Objectives Despite progress made to expand access to health service in Ghana, inequities still exist. Social innovations have been developed as community-engaged solutions to decrease inequities.

Methods In partnership with a multistakeholder group, our social innovation team organised a crowdsourcing contest to identify health innovations in Ghana. Informed by a WHO-Special Programme for Research and Training in Tropical Diseases framework, we organised a six-stage crowdsourcing challenge.

Results In all, 13 innovations were received in the contest, while 2 innovations were rejected after initial screening. The 11 innovations were reviewed by a panel of four independent expert judges. Inter-rated reliability index (kappa) was 0.86. Following the review of the average score, five top innovations were recognised. These submissions can be put into three main themes: technology and strengthening (eg, mHealth for cervical cancer screening, video directly observed therapy), inclusiveness and reaching the marginalised (people with disability and infertility) and data utilisation for project improvement (seasonal calendar to reduce morbidity and mortality of children under 5 for malaria, diarrhoea and pneumonia).

Conclusion In conclusion, this study shows that solutions to local problems exist. Therefore, policymakers, the government and development partners should support the scale-up of such innovations.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ In the last decade, many organisations have used crowdsourcing to engage with consumers in order to accelerate their search for new ideas and creation of knowledge.
⇒ This study demonstrates that solutions to local health challenges exist and could be harnessed through crowdsourcing.
⇒ Five selected social innovations covered application of technology, data utilisation, as well as inclusiveness of marginalised groups, to address communicable and non-communicable disease situations.
⇒ Healthcare providers, policymakers and development partners must engage innovators to ensure scale-up of innovations across underserved communities.
⇒ Although limited to relatively few submissions, further adoption of innovations can accelerate the country's efforts towards universal health coverage and achievement of the Sustainable Development Goals.

INTRODUCTION

Primary healthcare (PHC) is an important conduit towards achieving Universal Health Coverage (UHC) and health-related Sustainable Development Goals (SDGs).[1] Despite its critical role, several low/middle-income countries (LMICs) have challenges ensuring robust PHC services. Many studies have demonstrated that a health system that is based on primary care can expand health services to populations at lower cost with improved outcomes.[2 3] As a result, countries have explored various innovations to integrate healthcare into the PHC system to address inequities in access to essential healthcare.[4]

Ghana's healthcare system is not robust enough to fully meet the healthcare needs/demands of the Ghanaian populace.[5 6] From personnel to logistics and institutions, the nation is lagging, contributing to some preventable deaths. The 1978 Alma Alta declaration on primary healthcare aimed to make health services available and accessible using culturally appropriate strategies. Decades after this declaration, the world still has profound health inequalities and poor primary care services in many regions. One way to expand primary health services is through social innovation. Social innovations in health are inclusive solutions which address the healthcare delivery gap and meet the needs of end users through a multistakeholder, community-engaged process.[7] Nonetheless, it has been argued that the poor progress towards improving outcomes is not due to lack of technical solutions, as there is substantial evidence documenting the positive effects of a range of low-cost,

community-based interventions across the world.[8] To give a new lens to addressing challenges of access to healthcare and accelerate countries towards achieving the United Nations (UN) SDG, the Social Innovations in Health Initiative (SIHI) was formed in 2014. This initiative was formed to advance understandings and application of social innovations in the global south to address health inequities.[9 10] Given the strength of community-based health interventions in Ghana, we organised a crowdsourcing challenge to identify social innovation solutions. This paper reports on five innovations that were selected and recognised.

Crowdsourcing is an approach where a group of people attempting to solve all or part of a problem are identified through the sharing of solutions. Crowdsourcing allows large groups of individuals to participate in medical research through innovation challenges, hackathons and related activities.[11] In the last decade, many organisations have turned to crowdsourcing to engage with consumers, accelerate their innovation cycles, to search for new ideas and to create knowledge.[12 13] Although crowdsourcing has advanced in high-income countries, fewer studies have examined crowdsourcing in LMIC settings.[14] The crowdsourcing challenge typically involves six steps: (1) selection of challenge focus, (2) organising community steering group and selection panel, (3) engaging the community to contribute, (4) receiving and evaluating contributions, (5) recognising finalists and (6) sharing solutions.[15]

THEORETICAL FRAMEWORK

We adopted the Consolidated Framework for Implementation Research (CFIR). This framework applies systematic assessment of multilevel implementation contexts to identify factors that might influence intervention implementation and effectiveness.[16] The CFIR is composed of five major domains, each of which may affect an intervention's implementation.[16]

1. Intervention characteristics, which are the features of an intervention that might influence implementation.
2. Inner setting, which includes features of the implementing organisation that might influence implementation.
3. Outer setting, which includes the features of the external context or environment that might influence implementation. Four constructs are included in outer setting (eg, external policy and incentives).
4. Characteristics of individuals involved in implementation that might influence implementation.
5. Constructs that are related to characteristics of individuals (eg, knowledge and beliefs about the intervention).

Guided by this framework, innovators had to provide detailed information on their innovation touching on these critical areas.

METHODS
Crowdsourcing process and methodology

The overall purpose of the crowdsourcing call was to identify health innovations in Ghana. We adopted the implementation research cycle approach to this call. The project cycle is the sequence of phases that a project goes through from its initiation to its closure.[17] The pre-intervention activities included sensitisation through the website of the University of Ghana (UG), social media and student and faculty networks. In order to reach out to the larger university community, a flyer was developed for a pre-call announcement for the project. The flyer introduced the project to the larger university community, which was targeted by the first call for proposal. This was placed on the university website and distributed to individual faculty and senior officers' mails.

Even though the UG and the School of Public Health websites are very efficient and helpful in providing project information to key stakeholders, the project was also designed to have its own website linked to its Global Network Website managed from the Philippines—the Global Secretariat of SIHI Projects (https://socialinnovationinhealth.org/ghana/). This website was designed by the technical team in the Philippines in collaboration with the project technical team in the UG.

A four-member selection committee of experts was formed, which included senior faculty members with varied background and experience in public health, programme implementation, health policy planning and management, community engagement, project evaluation, health psychology and medical anthropology. The selection committee members were given copies of the call package and the selection criteria in advance.

The main call was opened for 4 weeks, 1 July 2020–31 July 2020. Innovators could submit their intervention online, offline (hard copy at project office) and through email. Submissions were monitored and reviewed regularly. The online (web-based and email) submission systems were designed to provide automated responses to innovators. Also, weekly reminders were sent through the UG listserv. To be eligible for submission, the innovation had to focus on one of the following: improving healthcare delivery, PHC, access to health and inclusive care, and contributing to health-related SDG, implemented in Ghana. These were adapted from materials developed by SIHI Uganda partners and other SIHI partners.[18] The call clearly indicated benefits of being selected as an innovator, which included innovators being offered an opportunity to share their social innovations with national, global SIHI network and partners, as well as institutions that could support with funding. In addition, innovators could participate in training on social innovation that would be organised by SIHI Ghana and the global network.

Patient and public involvement
No patient involved.

Table 1 Criteria for assessing innovations in Ghana as part of a crowdsourcing challenge, 2020

Selection criteria	Description	Weight
Appropriateness of the solution to the need	The approach addresses a healthcare delivery challenge that specifically deals with an infectious disease of poverty or could be applied to this disease group.	10%
Degree of innovativeness	The approach is new, different or a significant improvement within the context to which it is being applied.	25%
Inclusiveness	The approach has the potential to be used by a large number of people, enhancing equity and access.	15%
Affordability	The solution is affordable for the poor who are otherwise excluded in the local context or the solution is more cost-effective than the status quo.	10%
Effectiveness	The solution has a demonstrated positive outcome on the health of the local population.	15%
Scalable	Within and across cultural, resource and environmental contexts, the solution can be applied to reach many more people.	10%
Sustainable	The financial, organisational and market aspects of the solution are sustainable.	15%

RESULTS

At the end of the call period, 13 entries were received. However, two entries were disqualified by the project team at the eligibility assessment stage, because they only included plans for social innovation, without implementation. Eleven entries were eligible, blinded and submitted for review by the selection committee. Each submission was reviewed by at least three experts and given scores based on a criteria (see table 1).

The inter-rated reliability index (kappa) was computed, 0.86. Following that, five innovations were recognised based on ranked scores from the expert reviewers (table 2). The five selected innovations can be grouped into three themes: technology and task strengthening, inclusiveness and reaching the marginalised, and data utilisation for project improvement.

Innovations using technology and task strengthening

Under this theme, two main innovations were identified as using technology and task strengthening to increase access to cervical cancer screening and use of mobile technology to improve adherence to tuberculosis (TB) medication among women in their reproductive ages. The first innovation which was recognised is a capacity building of community health officers (CHOs) to employ mHealth strategy to screen women for cervical cancer using Visual Inspection of the cervix under Acetic acid (VIA) and cervicography. This project trained CHOs attached to the well-established Community-based Health Planning and Services (CHPS), a primary healthcare system in Ghana. The project employed a single-arm interventional training comparing diagnostic skills of 15 CHOs from CHPS compounds in periurban Accra, the

Table 2 Details of five innovations

Details	Innovation 1	Innovation 2	Innovation 3	Innovation 4	Innovation 5
Name of person who submitted	Adanna Nwammeme	John Ganle	Caroline Badzi	Samuel Tamti	Florence Naab
Name of founder(s) of innovation	Ogedegbe Olugbenga	John Ganle	Caroline Badzi	Sally Findley	Florence Naab
Name of solution	Visual Inspection of the cervix under Acetic acid (VIA)	Increasing Use of Modern Contraceptives and Skilled Delivery Services among women/girls with Disability in the Northern Region of Ghana	Use of Short Message Services and Video Directly Observed Therapy for Improve Adherence to Medication among Women with Tuberculosis	Season smart intervention study	Psychosocial Management of Infertility
Health domain	Cervical cancer	Sexual and reproductive health	Tuberculosis among women	Child health primary healthcare (malaria, diarrhoea and pneumonia)	Infertility
Size of implementing team	15	5	28	13	10
Number of beneficiaries	>100	>100	>100	>100	>100

capital of Ghana, with that of the expert reviewer with regard to VIA+cervicogram. This was done during the 6-month follow-up after the mHealth supported training. The mHealth intervention included a standard 2-week in-person training for VIA plus cervicography with subsequent 3-month guided review of cervicography images taken with mobile phones and submitted to the expert for review via text message or short message service (SMS). Feedback was directly provided to the CHOs on each image to enhance learning and skills acquisition. After the 3-month training, CHOs continued to do VIA+cervicography on their usual patients while taking pictures for a 6-month period. Of the 169 women who were screened, 13 (7.7%) tested positive for pre-cancerous lesions and were offered cryotherapy treatment at the screening centre. One suspected cancer case was referred to a tertiary hospital for further management. The total agreement rate between all VIA diagnoses made by all CHOs and the expert reviewer was 95%. The mean (SD) rate of agreement between each community health nurse (CHN) and the expert reviewer was 89.6% (12.8%).[19] The findings of the study showed that lower level health manpower could be trained to deliver cervical cancer screening to women at the community level.

The second innovation used mobile phone technology to monitor TB treatment among women with TB–HIV coinfection in Greater Accra Region, Ghana. The aim of the intervention was to assess the effect of daily SMS reminder messages on TB treatment adherence. In addition, acceptability of the SMS and the feasibility of video directly observed therapy (VDOT) intervention were assessed. The intervention comprised of 10 daily SMS reminder messages developed in a formative study preceding the data collection. A simple VDOT application was developed to present to participants during interviews. Participants from both the intervention and control groups were asked to indicate their willingness to use such an app. The app was developed and put on Google Play Store to allow the individual to self-video themselves taking their TB drugs and thereafter send to their respective nurses. The SMS reminder had increased adherence to anti-TB medications among participants from 57% to 81%. In logistic regression, the SMS reminders had an increased odds in participants' adherence to TB treatment by a fourfold (OR=4.42, 95% CI=1.64 to 12.11). More than three-quarters (86%) of participants were willing to recommend the intervention to others. The finding of this study showed an increase in adherence among those who received daily SMS and the VDOT was deemed acceptable by participants.

Innovations targeting the marginalised through inclusivity

Under this category, two innovations were identified: innovation to increase access to reproductive health services among people with disability and manual to provide psychosocial support for women with infertility. The first innovation was a project developed to increase the use of modern contraceptives and skilled delivery service among women/girls with disability. The overall goals of this solution were to: expand access to, and use of modern contraceptives and related services among women/girls with disabilities in Ghana. The innovation involved three integrated interventions: local health system strengthening in disability-centred reproductive health information/service delivery; support for disabled women/girls to access unfriendly healthcare infrastructures via low-cost local technology and support systems; and a community-based 'Safer Birth Buddy' system to provide referral/direct social support to disabled women/girls to access services. A total of 71 healthcare providers across three districts, including medical doctors, midwives and community health nurses, were trained. This number was a little above the originally planned target of 60 healthcare providers. Also, a total of 59 Community-based Safer Birth-Buddies Volunteers (CBSBVs)/Traditional Birth Attendants (TBAs) were trained. Among the 348 sexually active disabled women/girls who were involved in our intervention, only 13.2% (46) reported that they have ever used one form of contraception before intervention. However, contraceptive prevalence among the 348 disabled women/girls who were targeted more than doubled to 32.2% (112) after this intervention.

The second innovation developed and implemented a manual for psychosocial support and care for women with infertility. This manual was designed to address infertility-related depression, anxiety, stress and anger, and provide education on constructive thinking. Using this manual for psychotherapy has improved the psychosocial health of women with infertility who sought psychosocial help from OHaD Wellness Center. The manual has been tested in a randomised control trial in Ghana, and piloted at OHaD Wellness Center (see manuscript https://journals.sagepub.com/doi/full/10.1177/1359105319857175).

Innovation involving data utilisation for project improvement

The innovation under this category used season smart intervention to reduce newborn and childhood illness. The intervention applied the documented seasonal calendar for illnesses to the organisation of Integrated Management of Newborn and Child Illnesses (IMNCI) protocol so that prevention and treatment readiness occur in the 1–2 months preceding the peak, when it can have the most impact. A season smart reorganisation of the IMNCI clinical and community activities was implemented to improve the uptake of the preventive activities by participating families/community members, to reduce the incidence of the three targeted diseases (malaria, diarrhoea and pneumonia) and a reduction in mortality from these diseases among children under 5 years in the intervention area. Season smart approach must be integrated into the Ghanaian CHPS system with its community-based nurses and community-based health volunteer system. The intervention was able to reduce both newborn and childhood morbidity and mortality in the intervention area.

DISCUSSION

This crowdsourcing contest was conducted to identify social innovations in health that have been implemented to help address health inequities in Ghana. Our data suggest that crowdsourcing can identify community-engaged social innovations in Ghana. The crowdsourcing context identified innovations on technology and task strengthening, inclusiveness and reaching the marginalised and data utilisation for project improvement. The VIA+cervicography and task strengthening were very useful in expanding access to cervical cancer screening in Ghana. The advent of inexpensive smartphones equipped with good-quality digital cameras presents the opportunity to use them in enhancing training of health workers, facilitate storage of patient screening records for future reference and follow-up, transfer images for expert opinion and retrain (continuing education) via SMS.[19] During follow-up interviews with implementers and beneficiaries, it was revealed that this intervention was feasible and acceptable.[19] Therefore, incorporating this service into the benefits of the national health insurance scheme[20] would make it much more sustainable, by positioning this innovation for possible scale-up to other communities across Ghana.

The use of mHealth (SMS) and VDOT is novel in addressing the adherence to TB medication. With the high mobile penetrations in LMICs, the use of this technology has prospects in addressing non-adherence which has been identified as a challenge in TB control.[21] This approach has the potential of reducing the stigma experienced by patients during treatment, as currently the directly observed therapy (DOT) policy requires use of either a family member or a friend as treatment supporter.[22] However, studies have shown that people with TB may sometimes be unwilling to disclose their condition to non-health workers because of the stigma associated with the condition.[23–25]

Many sub-Saharan African nations continue to battle with high infant and child mortality. Majority of the illnesses contributing to high infant and child mortality are seasonal.[26] Two-thirds or more of childhood deaths in the subregion are due to three main diseases: malaria, diarrhoea and pneumonia.[27] As such, the use of seasonal calendar which integrates weather variability in healthcare is an important innovation and a proactive healthcare. This season smart innovation can also be incorporated into the organisation of IMNCI[28] so that prevention and treatment readiness could occur in the 1–2 months preceding the peak, when it can have the most impact. If this innovation is well integrated into the existing PHC system, it would easily be scalable and sustainable without additional cost being associated with its delivery.

The global agenda is to achieve the SDGs in way that leaves no one behind. Therefore, social inclusion is important to achieve this goal. Expanding reproductive health services to people with disability is therefore indispensable in achieving UHC. People with disabilities (PWDs) constitute 15% of the world's population. In Ghana, 7%–12% of the population has some disability.[29] This particular intervention, which expands contraceptive and skilled delivery services to marginalised groups such as PWDs, is particularly important in building more inclusive sexual, reproductive and maternal healthcare services. This has the potential to improve equity in health outcomes, and propel progress towards attainment of the SDGs related to universal access to sexual, reproductive and maternal health services.[30]

Although this study is the first to use crowdsourcing to identify social innovations in Ghana, the approach is not new globally. Studies have demonstrated that innovations identified through crowdsourcing have the potential for scale-up. This approach has been used to identify strategies for engaging youth in developing HIV services,[31] appropriate ways for designing a patient-centred mammography report[32] and ways to improve cancer research.[33] In addition, crowdsourcing has been used to identify and promote the adoption of effective community engagement strategies in HIV prevention and control.[34 35] Furthermore, a systematic review clearly showed that crowdsourcing is an effective way of identifying small-scale innovations that could be used to improve health systems in many settings as well as address inequity challenges.[14] Additionally, this approach used for identifying social community-based interventions is more cost-effective than other online approaches.[36 37] Although online search for innovation is important, this process may miss very important community-based interventions which have either not been published or shared as grey literature. Clearly from this study, it was obvious that some of these innovations were unknown to health policymakers at the district, regional and national levels.

The main limitation of this crowdsourcing is the relatively few submissions because it was limited to innovations implemented by members of the UG. Nonetheless, these submissions are of good quality and scalable. These innovations could be adopted/adapted in other LMICs that have similar health challenges, following recommendations as observed by the diffusion of innovation theory.[38] Incorporating crowdsourcing context into a health policy will ensure that policymakers are updated on health interventions across the country.

CONCLUSION

The findings of the study clearly showed that solutions to local problems exist and could be harnessed to achieve UHC. Supporting these innovations to scale up to help address health challenges facing underserved communities must be paramount in discourse among health providers, policymakers, the government and development partners to help achieve the UN SDGs.

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Ethics approval This study involves human participants and was approved by the University of Ghana College of Humanities Ethical Review Committee (ECH No: 149/19-20). Participants gave informed consent to participate in the study before taking part.

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