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Applying HCD to improve the uptake of routine immunization: A case of South Sudan

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There are no conflicts of interest to declare for this study.

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Abbreviations and acronyms

CHD	County Health Department
HCD	Human-Centered Design
HCW	Healthcare Worker
IPC	Interpersonal Communication
SEM	Socio-Ecological Model
UNICEF	United Nations Children's Fund
VPD	Vaccine-preventable diseases
WHO	World Health Organization

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The immunisation landscape in South Sudan

Immunization is one of the key pillars of public health as it helps in the prevention of most vaccine-preventable diseases.¹ However, the uptake of immunization in developing countries is low and hindered by several systemic barriers such as fragile political systems, weak health institutions and policies, as well as behavioral barriers, especially concerns around the safety of vaccines and misinformation linking vaccines to health conditions such as autism and infertility.^{2,3,4} The World Health Organization (WHO) notes that the global immunization coverage has tanked since the start of the COVID-19 pandemic, and that by 2023, over 2.7 additional million children, across the globe, were either unvaccinated or failed to complete the recommended immunization regime.⁵

This groundwork presents our experiences working with the UNICEF South Sudan office to increase the uptake of immunization among children in South Sudan, a country whose health ecosystem is undermined by conflict and political instability. UNICEF reports a high prevalence of zero-dose children, who have not initiated on any dose of required immunization, in South Sudan, with immunization coverage feared to be below the required national average.⁶

1 Mihigo, R., Okeibunor, J., Anya, B., Mkanda, P., Zawaira, F. (2017). Challenges of immunization in the African region. *The Pan African Medical Journal*, 27, 1- 6. doi: 10.11604/pamj.supp.2017.27.3.12127

2 Kahan, D. M. (2013). A risky science communication environment for vaccines. *Science*, 342, 53- 54. doi: 10.1126/science.1245724

3 Cipriano, J., Scoloveno, R., & Kelly, A. (2017). Increasing parental knowledge related to the human papillomavirus (HPV) vaccine. *Journal of Pediatric Health Care*, 32, 29- 35. doi: 10.1016/j.pedhc.2017.06.006.

4 Masika, M. M., Ogembo, J. G., Chabeda, S. V., Wamai, R. G., Mugo, N. (2015). Knowledge on HPV vaccine and cervical cancer facilitates vaccine acceptability among school teachers in Kitui County, Kenya. *PLoS ONE* 10, 1- 10. doi:10.1371/journal.pone.0135563

5 World Health Organization (WHO). (2024). Global childhood immunization levels stalled in 2023, leaving many without life-saving protection [Press release]. Available at <https://www.who.int/news/item/15-07-2024-global-childhood-immunization-levels-stalled-in-2023-leaving-many-without-life-saving-protection#>

6 UNICEF (2024, July). Immunization. <https://data.unicef.org/topic/child-health/immunization/>

South Sudan's healthcare system is fragile, and this is exacerbated by the many years of sectarian violence and political instability that the country has experienced since gaining independence.⁷ These include challenges such as mass displacement of entire communities, weak healthcare infrastructure, and low investments in the healthcare system that have adversely affected the provision and access to routine immunization.⁸ To date, the country reports significant challenges, such as a high under-five mortality rate at 96 per 1,000 live births, with vaccine-preventable diseases (VPDs) being a leading cause. County-level disparities paint a grimmer picture of the state of routine immunization coverage, with 66 counties reporting having between 50 and 8,500 zero-dose children.⁹ The following section describes the nature of the project and the approach taken.

7 Rahamtalla, B., Medani, I., Salih, A., Hashim, K. N., Albasheer, K., Munder, O., ... & Dawelbait, A. (2025). The impact of ongoing armed conflict on Sudan's healthcare system: narrative review. *Discover Health Systems*, 4(1), 49. <https://link.springer.com/article/10.1007/s44250-025-00232-8>

8 World Health Organization (WHO). (2025). Investing in health development amid multiple protracted crises: South Sudan annual report 2024. WHO Regional Office for Africa. <https://www.afro.who.int/countries/south-sudan/publication/who-south-sudan-2024-annual-report>

9 World Health Organization (WHO), & United Nations Children's Fund (UNICEF). (2025). Revitalizing routine immunization in South Sudan: Perspectives and priorities. WHO Regional Office for Africa. <https://www.afro.who.int/publications>



Description of the project

To enhance the integration of human-centered design (HCD) in healthcare and address the behavioral, contextual and systemic drivers to the uptake of routine immunization, Busara, working closely with the South Sudan Ministry of Health and UNICEF, started an initiative to enhance the application of Human-Centered Design (HCD) principles in the development of contextually relevant and sustainable strategies to improve the uptake and utilization of immunization services in targeted communities. HCD is an approach that involves the development of usable and useful systems oriented around a deep understanding of the needs and requirements of users to enhance the effectiveness, accessibility, satisfaction, and efficiency of said systems.¹⁰ HCD encourages the continuous participation of end-users as key contributors, from problem identification to designing user-centric solutions and providing iterative feedback for constant and sustainable improvements.

HCD is of particular importance in development and health-based contexts, as the utilization of healthcare services, such as routine immunization, is heavily dependent on a range of behavioral, attitudinal, and contextual factors. Therefore, by incorporating HCD in healthcare service delivery, by engaging with caregivers, household decision-makers, and service providers, these services and initiatives can be enhanced to reflect the real-world conditions and needs of these users.

This project also aimed to mainstream the use of community-driven evidence and insights to improve regular healthcare service delivery and optimize uptake of RI and other primary healthcare services among these communities.

¹⁰ International Organization for Standardization. (2019). ISO 9241-210:2019 — Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems. <https://www.iso.org/standard/77520.html>

Our approach

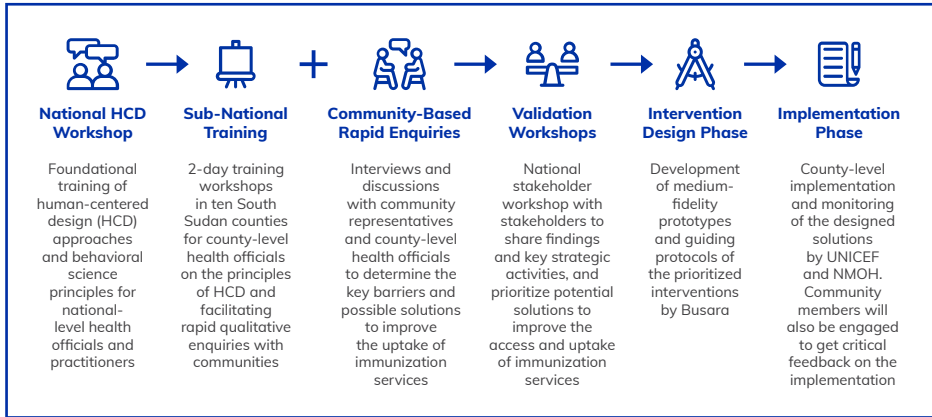


Figure 1: An overview of the approach used to enhance the incorporation of HCD in routine immunization (Source: Busara)

To achieve our goals, generating community insights to inform our understanding of the context, developing relevant interventions, and enhancing the local capacity to support HCD implementation in South Sudan, we conducted the following key activities:

a) Capacity building of national and subnational healthcare practitioners and stakeholders on HCD and behavioral science principles.

From April to May 2024, we facilitated a series of participatory training workshops on Human-Centered Design with stakeholders drawn from the National Ministry of Health, state health teams, and implementing partners in the counties. The HCD training began with a one-day national workshop in Juba, followed by subsequent two-day sub-national workshops in ten of the least-performing counties across six states and the Ruweng Administrative



Area, as indicated below:^{11, 12}

- **Central Equatoria** (Lainya and Kajo-Keji counties)
- **Jonglei** (Duk and Bor South)
- **Northern Bahr el Ghazal** (Aweil East and Aweil North)
- **Ruweng Administrative Area** (Pariang)
- **Unity State** (Leer and Rubkona)
- **Upper Nile** (Fashoda and Panyikang)

These workshops employed a participatory learning approach incorporating open discussions, real-world case studies, practical activities, and pre- and post-tests. This community participatory approach places individuals from the communities at the center of the issue, or their representatives, at the heart of the research—not as study participants but as an integral part of the research process.¹³

In addition to the HCD training, the sub-national participants were also trained to conduct rapid qualitative community inquiries on barriers and enablers to routine immunization and other primary healthcare services, such as maternal nutrition.

11 Jil, J. P. (2022). Immunization status of children aged 12-23 months in Jonglei State, South Sudan: A cross-sectional epidemiologic study. *Pan African Medical Journal*, 41. <https://doi.org/10.11604/pamj.2022.41.258.31637>

12 Sami, S., Mayai, A., Sheehy, G., Lightman, N., Boerma, T., Wild, H., Tappis, H., Ochan, W., Wanyama, J., & Spiegel, P. (2020). Maternal and child health service delivery in conflict-affected settings: A case study example from Upper Nile and Unity States, South Sudan. *Conflict and Health*, 14(1). <https://doi.org/10.1186/s13031-020-00272-2>

13 Collins, S. E., Clifasefi, S. L., Stanton, J., Board, N. L. A., Straits, K. J. E., Gil-Kashiwabara, E., Espinosa, P. R., Nicasio, A. V., Andrasik, M. P., Hawes, S. M., Miller, K. A., Nelson, L. A., Orfaly, V. E., Duran, B. M., & Wallerstein, N. (2018). Community-based participatory research (CBPR): Towards equitable involvement of community in psychology research. *American Psychologist*, 73(7), 884–898. <https://doi.org/10.1037/amp0000167>

b) Community rapid inquiries and evidence-based co-creation of HCD solutions.

Following the sub-national training workshops, the state teams conducted a series of qualitative rapid community enquiries in each of the focal counties to understand the critical barriers and levers to the uptake of routine immunization. These discussions were held with:

- Caregivers of children under the age of five years,
- Community and religious leaders, and,
- Community health workers - to get a balanced view from the supply and demand perspectives.

These enquiries highlighted the importance of directed communication for caregivers on routine immunization to address existing gaps in knowledge among caregivers and household decision-makers, tackling gender norms and roles in health-seeking behaviors and decisions, enhancing male involvement in immunization uptake, improving community engagement through dialogues, and enhancing service provision through structured communication trainings for healthcare workers and opportunities for recognition. The community enquiries were guided by the social ecological model (SEM). They explored the barriers to routine immunization that exist at the individual, interpersonal, community, and public levels of the community. The social-ecological model considers the complex interplay between individual, relationship, community, and societal factors that interact to either hinder or enhance behavior.¹⁴ The findings of these enquiries formed the basis of the co-creation process in which the community members proposed solutions that they believed could effectively address the identified barriers.

14 Kilanowski, J. F. (2017). Breadth of the socio-ecological model. *Journal of Agromedicine*, 22 (4), 295–297. <https://doi.org/10.1080/1059924x.2017.1358971>



c) Pre- and intra-implementation mentorship support for state and county implementers of the designed solutions.

The mentorship component of the initiative was designed to enhance the capacity of selected healthcare professionals and county-level health teams (mentees) to effectively manage the implementation phase of the project. This support model combined in-person training, ongoing virtual mentorship, and structured guidance using tailored tools to provide continuous support throughout the implementation phase. We aimed to enhance both technical orientation and adaptive capacities as implementation progressed. Mentees were expected to lead the implementation activities confidently, maintain timely and accurate reporting, and serve as peer-to-peer mentors to prompt ongoing knowledge sharing and capacity building within the county teams.

Findings from the project

Subsequent thematic analysis of the community rapid enquiry transcripts revealed critical barriers and levers to the uptake of routine immunization. These barriers are as follows:

a) Structural barriers include operational inadequacies at health facilities, such as shortages of essential drugs, testing equipment, and trained staff, as well as broken cold chain linkages and inadequate infrastructure. The community members also reported that the health facilities have poor sanitation and are underfunded. They also cited logistical challenges, including long travel times, seasonal flooding, and lack of transportation during floods, as further factors that impede access to immunization services. Additionally, population density and insufficient immunization days strain available resources, while economic constraints—such as poverty and inflation—force caregivers to prioritize survival needs over healthcare.

b) Behavioral and cognitive barriers further compounded these challenges. Caregivers often lack accurate information about immunizations and are influenced by widespread misinformation (e.g., vaccines cause infertility), cultural myths, and fear of side effects. Many caregivers were also unaware of vaccination schedules or campaigns, while others deprioritized healthcare due to farming seasons, household burdens, or a lack of motivation stemming from perceived low benefits. Some mothers, especially in rural and food-insecure areas, choose income generation over clinic visits, even selling livestock to afford treatment when needed.

c) Social and cultural norms also shape access to immunization services. Gender roles, for instance, restrict male participation in child health as that is seen as a role for mothers, while traditional beliefs—such as keeping newborns indoors for months so they are not seen by evil eyes—delay early immunization. In general, community perceptions of immunization vary, with some viewing it as virtuous and others as taboo. Additionally, decision-making dy-



namics within households and gender expectations place the burden of seeking healthcare on women, even when men hold decision-making power.

d) Communication barriers further limit uptake. Caregivers report poor interaction with healthcare providers, including dismissiveness, bias, or a lack of follow-up, especially for those who live far from health centers or lack access to education. Weak reminder systems and the loss of immunization cards also contribute to missed appointments. At the same time, community members in remote areas often lack access to promotional health messages or are unaware of available services. Negative interactions with providers discourage return visits and foster mistrust.

These barriers underscore the complexity of driving immunization uptake in South Sudan and the need for more innovative solutions to address them. The diagram below showcases the key barriers along the patient journey.

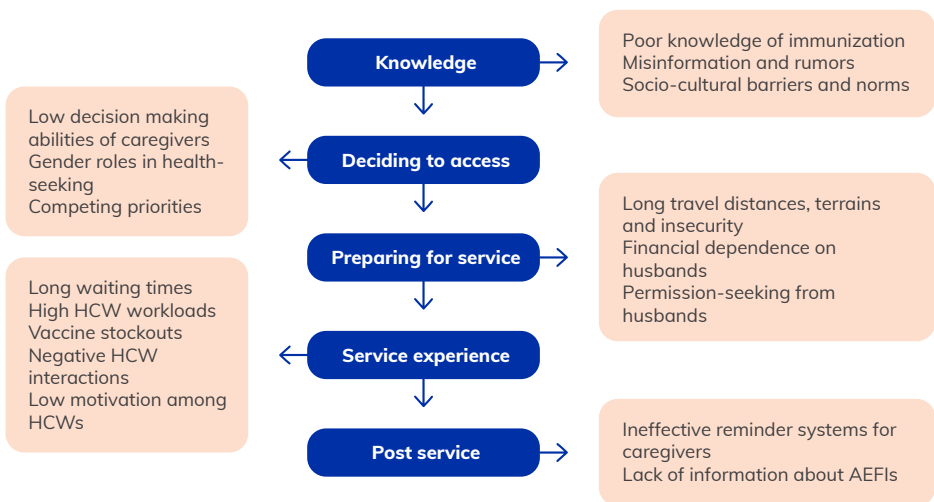


Figure 2: The barriers to immunization services mapped on the typical patient journey (Source: Busara)

Based on the key findings of the community rapid inquiries and through a series of co-design and prioritization sessions, four tailored interventions were identified and developed to strengthen the uptake of routine immunization in South Sudan:

1. Community-based immunization forums: Monthly forums designed to bring together caregivers, community members, and local decision-makers to openly discuss immunization concerns with service providers, build awareness, and promote greater community engagement with immunization services.

2. Healthy fathers' forums: Targeted community sessions specifically for men, including husbands and household heads, to engage with the health system, address their immunization-related concerns, and strengthen male involvement in child health decision-making.

3. Interpersonal communication (IPC) training for healthcare workers: A series of short, interactive training sessions for community-level healthcare providers aimed at enhancing their communication and engagement skills to build trust and improve interactions with community members on immunization.

4. Informational materials for mothers and caregivers: A tailored awareness campaign providing clear, culturally relevant information and immunization reminders explicitly designed for mothers and caregivers to support timely uptake of services.

We also developed unique session guides to facilitate each of the forums and training sessions, as well as communication materials, such as posters, immunization calendars (a reminder system for caregivers), and posters for use in community-based implementation. These were translated into the local languages to ensure comprehension, accessibility, and ease of understanding for diverse community groups.



Our lessons from the project

Scaling human-centered design (HCD) in South Sudan has been a powerful reminder of the importance of empathy and user experience, especially in fragile, low-resource settings. Although the implementation phase is still ongoing in the field, through the joint work by UNICEF and the Ministry of Health, our engagement in this study provided us with valuable insights as outlined below:

a) The value of collaboration

When designers, implementers, and community members work collaboratively, it creates a continuous feedback loop that strengthens both the solutions and the relationships. This ongoing exchange not only improved the interventions we co-created but also fostered greater trust and community engagement. Enhancing opportunities for peer learning among facilitators of the implementation phase, i.e., through mentorship support sessions, emerged as one of the key mechanisms for this process, with mentees and supervisors drawing insights and learnings from their peers in other countries. This collaborative approach is critical for ensuring the success of the solutions.

b) The importance of men's involvement in health conversations

A critical part of this work involved applying a gender lens. Some of the proposed interventions, such as the father's forums, were a standout example to demonstrate the vital importance of including men in health conversations. These forums helped challenge traditional gender roles and promoted shared decision-making in maternal and child health by engaging men as active champions of RI in their households and communities. At the same time, teams made a deliberate effort to amplify women's voices, using culturally sensitive facilitation techniques to create safe, inclusive spaces where everyone could contribute.

c) Embed change from within

Building local capacity isn't just a means to an end; it's a core outcome. Training local teams in HCD not only supported the success of this project but also laid the groundwork for long-term change by embedding user-centered thinking within the health system itself. The first set of mentorship sessions highlighted the need for hands-on guidance for field implementers to ensure that the applications of the solutions are always aligned with HCD principles.

d) Iterative testing was crucial for refining our interventions

Iterative testing played a critical role in refining our interventions. By continuously testing prototypes with community members and frontline health workers, we gathered real-time feedback and adapted our solutions to better align with the lived realities of users. This process of testing, learning, and refining ensured that interventions were not only contextually relevant but also feasible.

e) Considering context is key to driving the desired change

From our interactions with the Ministry of Health, we were to learn of the unique challenges in the identified counties with the highest prevalence of zero-dose. For example, some counties are located in areas near the border with Sudan, others are prone to flooding, and others are in areas where cattle keepers reside. Thus, considering the diversity of these counties and their unique challenges was crucial in designing solutions, as what works in one location may not work in another. Additionally, while we leveraged our experience working in other countries, we did not let this blind us to the unique context in South Sudan.¹⁵

15 Nyaga, R. G., Wambua, R., Kaur, K., Okafor, A., & Mahiaini, F. (2025). *Lessons from the field: What have we learnt from six years of doing qualitative research?* (Busara Groundwork No. 22, Lessons Learned). Nairobi: Busara. <https://doi.org/10.62372/TQUI9790>



f) Collaborate with local partners on both technical and logistical issues

In this engagement, we collaborated with the Ministry of Health and local partners to design and execute field activities. The Ministry of Health, for example, was crucial in helping us liaise with the state Ministry of Health and schedule our field activities at times when disruptions were likely to be minimal due to ongoing rains or national health emergencies. On the other hand, a local business partner was instrumental in helping us fund field activities, while another partner was useful in assisting us with designing our research studies and advising on the project's implementation. It would have been a huge logistical challenge for us to do all activities by ourselves without the input of the local partners, as they understood the local context better than us.

Ways of driving immunization in resource-constrained contexts

As we worked to scale Human-Centred Design (HCD) in South Sudan, we were constantly reminded that meaningful solutions begin with deep empathy and a clear understanding of the lived realities of those we aim to serve. In a context marked by fragility and limited resources, HCD offered not just a methodology, but a mindset—one that prioritized listening, learning, and co-creating with communities. Along the way, we gathered key insights about what it truly takes to build inclusive, responsive, and sustainable interventions.

Below, we reflect on some of the most important lessons and offer actionable takeaways to guide future work.

a) Prioritize user-centered approaches in program design

In fragile settings, designing from users' lived experiences, not donor agendas or assumptions, is essential. Brown and Wyatt (2010) stress that design thinking reframes problems from the ground up, enabling solutions that are both innovative and responsive. This is particularly important where communities are often marginalized from formal planning processes. Our groundwork piece, "[Lessons from the Field](#)", advocates for fostering opportunities for community participatory approaches to research and highlights the importance of enhancing community voices throughout the research process.¹⁶ In South Sudan, our solutions were rooted in the stated needs of the community, based on data collected by trusted community members and local healthcare workers.

16 Nyaga, R. G., Wambua, R., Kaur, K., Okafor, A., & Mahiaini, F. (2025). *Lessons from the field: What have we learnt from six years of doing qualitative research?* (Busara Groundwork No. 22, Lessons Learned). Nairobi: Busara. <https://doi.org/10.62372/TQIJ9790>



b) Institutionalize iteration through prototyping and feedback loops

Build in structured opportunities for rapid testing, learning, and adaptation throughout the project cycle. Continuous feedback and rapid prototyping are cornerstones of HCD. As IDEO.org (2015) highlights, iterative cycles help adapt interventions to real-time realities, a necessity in unpredictable environments like South Sudan. Embedding these loops, grounded in both qualitative insights and quantitative survey data, increases solution relevance, effectiveness, and sustainability, ensuring that they remain contextually relevant and responsive to user needs throughout the implementation phase. To guide future iterations of our solutions in South Sudan, we designed four accompanying data collection tools including pre-/post-forum interview guides, household knowledge surveys and anonymous feedback forms.

c) Design with context, not despite it

Ensure all design efforts deeply account for political realities, cultural norms, and local power dynamics. Engage local actors early to co-interpret the context. For instance, when considering translations, ensure that you also consider the reading comprehension levels of the target audiences, i.e., in South Sudan, some caregivers may speak Dinka fluently but not be able to read text in the language. Ignoring power dynamics, language barriers, or political complexity undermines even the best-designed tools. As Bason (2014) notes, effective public design work requires engaging with context at multiple levels, social, institutional, and cultural. An easy consideration to always bear in mind is to solve for the base of the pyramid; the needs of the majority of the target audience.

d) Embed gender responsiveness in every step of the design process

Move beyond simply collecting gender-disaggregated data towards more meaningful and active engagement of both men and women in culturally appropriate ways. Solutions like the father's forums can help shift social norms, gender expectations and improve health outcomes through active dialogue and reflection activities. Cornwall and Rivas (2015) argue that participatory development efforts that incorporate gender dialogue not only improve equity but also foster broader social transformation.

e) Position communities as co-designers, not just participants

Create space for communities to shape, test, and refine solutions. Genuine co-design builds trust, increases adoption, and leads to solutions that resonate. According to Chambers (1997), shifting power to communities in research and intervention design is critical in complex, resource-constrained settings where external actors often miss key dynamics.

f) Align HCD efforts with government systems and structures

Collaborate with government stakeholders to integrate user-centered approaches into existing policies, delivery systems, and priorities for scalable impact. The community health department (CHD) community-based forums, for instance, leveraged the regular community sessions already being facilitated in the counties. Such alignment and collaboration with local governance structures not only reinforces institutional ownership but also enhances the long-term viability of designed solutions. As Pritchett et al. (2013) explain in their work on problem-driven iterative adaptation, alignment with existing delivery systems enhances the viability of lasting reform and reduces the risk of creating parallel structures that may not endure.



g) Invest in local design capacity as a strategic goal

Move beyond short-term/one-off training to build lasting design capabilities within local institutions, ensuring the sustainability and growth of HCD practices over time. Achieving this requires targeted investments in strengthening the skills of local actors so that they can independently adapt and scale interventions. This was a strategic goal of this project: to empower local health sector actors with the tools and confidence to embed and sustain HCD approaches in their work. Akama (2014) emphasizes that localized design leadership fosters innovation grounded in lived realities, not borrowed paradigms.

Conclusion

While driving the uptake of immunization is a complex phenomenon that is influenced by micro and macro-level factors, this project showcased the importance of HCD in solving complex health problems in volatile settings. We were able to co-create solutions relevant to the community, based on real-life situations, by leveraging empathy, co-creation, and continuous iteration throughout every step of the project. These solutions directly address the behavioral and structural barriers that hinder communities from receiving routine immunizations.

This work is important because it demonstrates the importance of designing with communities, rather than for them. It demonstrates that lasting change in public health must stem from strong local involvement and collaboration, an awareness of gender and social issues, and working with existing systems and structures. This is especially important in light of the shrinking funding space and shift in priorities within the development sphere. Thus, going forward, efforts to scale and replicate these kinds of interventions should continue to focus on local ownership, institutional learning, innovation, and long-term investment in local design capacity.



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About Busara

Busara is a research and advisory organization, working with researchers and organizations to advance and apply behavioral science in pursuit of poverty alleviation. Busara pursues a future where global human development activities respond to people's lived experience; value knowledge generated in the context it is applied; and promote culturally appropriate and inclusive practices. To accomplish this, we practice and promote behavioral science in ways that center and value the perspectives of respondents; expand the practice of research where it is applied; and build networks, processes, and tools that increase the competence of practitioners and researchers.

About Busara Groundwork

Busara Groundwork lays the groundwork for future research and program design. As think pieces, they examine the current state of knowledge and what is needed to advance it, frame important issues with a behavioral perspective, or put forward background information on a specific context.

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