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A process evaluation of participatory community activities for Revitalizing Informal Settlements and their Environments in Makassar, Indonesia and Suva, Fiji

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Abstract

A process evaluation of participatory community activities for Revitalizing Informal Settlements and their Environments in Makassar, Indonesia and Suva, Fiji

By Thea Mink

Inclusive community engagement is essential for transformative water and sanitation interventions that attempt to address infrastructure and behavior change in complex environments like urban informal settlements. The aim of this process evaluation was to assess participatory design activities' reach and participant-reported influence over program decision-making with a focus on gender and social inclusion. The process evaluation was a sub-study within Revitalizing Informal Settlements and their Environments, a water-sensitive randomized control trial in Makassar, Indonesia and Suva, Fiji. Data on reach and influence were collected from 320 respondents across 5 settlements in Makassar and from 503 respondents across 6 settlements in Suva. Cross tabulations and chi-square tests were used to describe and analyze the relationships between participation in activities and participants' socio-demographic characteristics, as well as to assess the relationship between participants' experienced and desired influence levels. Multivariable models assessed socio-demographic predictors of participation in primary activities. The results indicated that most target audiences were reached for primary participatory activities, with notable exceptions for ethnic minorities, younger residents, and unmarried residents in Makassar and residents living with disabilities and residents with less education in Suva. The majority of participants in both countries also reported having at least a little influence over RISE-related decision-making, however a substantial proportion would have preferred to have had more influence. The findings highlight the importance of formative community engagement to understand context-specific social dynamics and to appropriately include groups of interest in participatory activities. This process evaluation also demonstrates the use of participant-reported influence as a measure of dose received to better evaluate equitable community engagement.

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Introduction

Globally, one billion people live in urban informal settlements, which regularly contend with unimproved water and sanitation services, in addition to insufficient living areas, poor housing durability, and unstable land tenure (United Nations-Habitat, 2021). Poor water and sanitation conditions, in turn, increase the risk of diarrheal disease, parasitic infections, and childhood stunting, among other negative health outcomes (Dangour et al., 2013; Darvesh et al., 2017; Kimani-Murage & Ngindu, 2007; World Health Organization [WHO], 2018). The Sustainable Development Goals (SDGs) aim for urban communities to become inclusive, safe, and resilient by 2030 (SDG 11) (United Nations [UN], 2015). The target of SDG 6, in particular, is to provide access to water and sanitation for all populations, including people in vulnerable circumstances, women, and girls (SDG 6.2) (UN, 2015). To achieve these SDGs in complex environments like urban informal settlements, comprehensive water and sanitation interventions are needed to address the connections among environmental conditions, human health, and community social dynamics (Caruso et al., 2021; Cumming et al., 2019; French et al., 2021; MacArthur et al., 2020).

Revitalizing Informal Settlements and their Environments (RISE) is a randomized control trial aiming to reduce environmental contamination and to improve human and ecological health through a water-sensitive infrastructure intervention in urban informal settlements in Makassar, Indonesia and Suva, Fiji (Leder et al., 2021). Community engagement (co-design) activities were a key component of the infrastructure design and planning process for each intervention settlement (Leder et al., 2021; Prescott et al., 2021). Co-design workshops and household visits were specifically intended to reach a diverse population (with a particular focus

on marginalized groups and women) and to meaningfully collaborate with participants in intervention decision-making (Prescott et al., 2021). However, there is a lack of understanding around who was included in the RISE co-design activities and if participants felt like their voices were heard in decision-making processes that affected their households and communities.

This sub-study is a quantitative process evaluation that aimed to determine reported participation, barriers to participation, and influence in program-related decision-making with a focus on gender and social inclusion for RISE co-design activities. Saunders et al.'s process evaluation framework, which includes indicators for reach and dose received, guided analysis of data on participation (reach), barriers to participation, and influence (dose received) (2005). The following research questions were used to compare the participatory design activities' intended participation and participant influence with what was implemented in Makassar and in Suva:

I. Who participated in the primary RISE co-design activities?
    A. What were the predictors of participation (socio-demographic characteristics) in the primary RISE co-design activities?
II. What were the main barriers to participation in RISE activities?
III. How did participants' experienced levels of influence over program-related decision-making align with the levels of influence they would have preferred?

Findings from this process evaluation will help assess the implementation of RISE community engagement activities, as well as facilitate understanding of how process evaluations and co-design activities can be better implemented in future water-sensitive interventions for improved human and environmental health.

Literature Review

Water and Sanitation Conditions in Urban Informal Settlements

Inadequate water, sanitation, and hygiene (WASH) is associated with negative health outcomes such as diarrheal disease, parasitic infections, and childhood stunting (Dangour et al., 2013; Darvesh et al., 2017; WHO, 2018). In 2020, it was estimated that 2 billion people lacked safely managed water services and that 3.6 billion people lacked safely managed sanitation services (UN & United Nations International Children's Emergency Fund [UNICEF], 2021). While global trends in water and sanitation services are improving, in some urban areas, access to basic and safely managed water and sanitation services has slowed or decreased (UN & UNICEF, 2021). In particular, an additional 32 million people living in urban areas had inadequately managed water services between 2015 and 2020 (UN & UNICEF, 2021).

People living in urban informal settlements are particularly at risk for suboptimal WASH conditions, in addition to other challenges (Turley et al., 2013). Since 2003, United Nations member states have defined informal settlements as having a lack of access to one or more of the following: (1) improved water sources, (2) improved sanitation services, (3) sufficient living area space, (4) housing durability, and (5) land and/or home tenure (UN-Habitat, 2021). Residents of informal settlements typically contend with overcrowding and high-risk physical environments because they are situated in marginal lands that are undesirable for other uses, like river banks and coastal areas (Satterthwaite et al., 2020). Such locations are often exposed to natural and man-made hazards, such as flooding, landslides, garbage dumps, and highways (P. Jones, 2016; Satterthwaite et al., 2020; Turley et al., 2013). Natural disasters are intensifying with climate change, further impacting informal settlements' built and natural environments, as

well as urban migration (Gero et al., 2017). Extreme weather events and sea level rise can affect human and ecological health by contaminating water systems and increasing disease transmission (Satterthwaite et al., 2020). Chronic heat stress is also experienced in informal settlements at temperatures greater than the recommended thresholds for physical activities, creating additional conditions that impact residents' health and economic outcomes (Ramsay et al., 2021).

Urban informal settlements are also characterized by inadequate water and sanitation conditions. Residents often have poor water access, quality, and reliability (Lewis et al., 2018; Schrecongost & Wong, 2015). Poor microbial water quality increases the risk of waterborne illness, especially in areas where unimproved latrines and surface runoff from open defecation areas contaminate water supplies (Kimani-Murage & Ngindu, 2007). People are also more likely to store water if access is not reliable, which can lead to contamination if not treated appropriately (Sobsey et al., 2003). Like with water services, informal settlements often have poor sanitation access. Households commonly rely on shared sanitation facilities, which are associated with an increased risk of diarrheal disease and helminth infections, among other health consequences (Fuller et al., 2014; Heijnen et al., 2014, as cited in Sinharoy et al., 2019).

Over 35% of the one billion people living in urban informal settlements were located in East and South-East Asia in 2018 (370 million) (UN, 2019). In Indonesia, the proportion of the population living in informal settlements decreased from 50.8% in 1990 to 23.0% in 2010 (UN, n.d.). More recently, the proportion increased from 21.8% to 30.6% between 2014 and 2018 (UN, n.d.). While trends in water and sanitation services in Indonesia have improved in urban areas over the last 20 years to 97.6% coverage of basic water services and 91.6% coverage of

basic sanitation services, water and sanitation conditions in urban informal settlements vary across the archipelago (Joint Monitoring Programme, n.d.; Otsuka et al., 2019; Semba et al., 2009; Shibata et al., 2015). In Makassar, the provincial capital of South Sulawesi, residents of informal settlements commonly get their drinking water from pipes into their homes (or nearby) or from bottled water (Shibata et al., 2015). Consumption of inexpensive bottled water was associated with increased under-five child mortality and diarrhea incidence in Indonesian informal settlements (Semba et al., 2009). Like with the general population, septic system sanitation facilities are the most common; however, unimproved sanitation facilities are also prevalent (Shibata et al., 2015).

Informal settlements across Pacific countries also have varying water and sanitation conditions (Gero et al., 2017). From 2014 to 2018, the proportion of the population in the Pacific living in informal settlements remained stable at around 24.0% (UNICEF East Asia & Pacific Regional Office, 2021). Coverage of basic drinking water also remained fairly stable at 85.0% from 2015 to 2020 (UNICEF East Asia & Pacific Regional Office, 2021). Over the same time period, basic sanitation coverage in Oceania decreased slightly from 74.0% to 71.0% (UN & UNICEF, 2021). Assessments in Melenesian informal settlements suggest that informal water sources and open defecation are still prevalent (Gero et al., 2017; Schrecongost et al., 2015). In Fiji, the proportion of people living in urban informal settlements is lower than the regional average at 11.2% (UN, n.d.). Around Fiji's capital, Suva, informal settlement residents often rely on piped water, although water can be intermittent and water storage is frequently practiced (Schrecongost et al., 2015; Schrecongost & Wong, 2015). Sanitation facilities are often used by single households, however unsafe disposal of fecal sludge is common (*Fiji Informal Settlement*

Situation Analysis, n.d.; Schrecongost & Wong, 2015). Some informal settlements around the greater Suva area are also connected to sewer systems (Schrecongost et al., 2015).

Community Participation (Co-Design) for WASH

Community participation is regarded as a central part of "transformative" WASH interventions that attempt to comprehensively address service infrastructure and behavior change in complex environments like urban informal settlements (Caruso et al., 2021; Cumming et al., 2019; MacArthur et al., 2020). Participation was first formally promoted as a key component of primary health care through its inclusion in the 1978 declaration of Alma-Ata (International Conference on Primary Health Care, 1978). Since then, community participation in public health interventions has been broadly defined and implemented. Control (or influence) is regarded as a central piece of community participation, which can range from minimal "utilitarian" participation (whereby 'participants' provide labor or money to offset program costs), to collaboration with external actors, to empowerment with stakeholders driving and controlling decision-making (Kahssay & Oakley, 1999 and N. Nelson & Wright, 1995, as cited by Morgan, 2001; Rifkin, 2009, 2014). In Arnstein's ladder of citizen participation, more meaningful participation at higher ladder rungs is linked with improved community power and control (Arnstein, 1969). Greater control, in turn, is considered important for community ownership and long-term resource management (Pierce et al., 2001, as cited by S. Nelson et al., 2021).

Efforts to increase communities' influence in health programming led to the adaptation of other research fields' participatory approaches, such as co-design (Bradford et al., 2018). Co-design is the process of actively involving participants throughout the project design cycle, whereby community members collaborate with other stakeholders through project

idea-generation, planning, implementation, and management (Moretto et al., 2018; Prescott et al., 2021; Slattery et al., 2020). Partnerships among communities, local governments, and external groups based on the principles of co-design can enable greater community control (Hubbard et al., 2011, as cited by S. Nelson et al., 2021).

Within the WASH sector, participatory approaches like co-design are used to tailor interventions to communities' environmental, cultural, and economic landscapes, and preferences (S. Nelson et al., 2021). Specific participatory activities include community-level activities, such as transect walks, where community mobilizers and members observe and discuss water and sanitation issues; community mapping, where participants draw their communities and identify key spaces; and ranking exercises, where community members clarify priorities (Boisson et al., 2014; Prescott et al., 2021). Other participatory methods are conducted at the household level, such as home visits or consultations, where additional residents are reached and specific household issues are discussed (Sclar et al., 2022). Community participation through such activities contributes to benefits like increased intervention awareness and acceptance, enhanced community ownership, and improved management and sustainability (Jiménez et al., 2019). Participatory approaches have also been associated with community satisfaction and equity (Prokopy, 2005; World Bank, 1995).

Participation is viewed as an end goal for increased equity in addition to being used as a means for better program outcomes (George et al., 2015; Madon et al., 2018; Rifkin, 2003; Tritter & McCallum, 2006). Towards the goal of increased equity, there is a global focus on promoting greater inclusion through participatory practices; gender equity and social inclusion (GESI), for example, is considered a key component of comprehensive water and sanitation

(Grant et al., 2017; MacArthur et al., 2020; Narayanan et al., 2012; Sinharoy & Caruso, 2019; Stephens et al., 2018). Gender and social inclusion principles emphasize the importance of engaging all community members, including those who are more likely to be marginalized, such as women, people with disabilities, ethnic minorities, and the elderly (Yang et al., 2016). These populations often experience poor water and sanitation access and quality and are often excluded from decision-making by societal and intrahousehold hierarchies (Assefa et al., 2021; H. Jones et al., 2012; Routray, Torondel, Clasen, et al., 2017; Tinoco et al., 2014; Wali et al., 2020; White et al., 2016). In informal settlements, these groups are often at the intersection of "multiple deprivations," which compounds their social vulnerability with challenges like land tenure and stressful living conditions (James, 2014).

Community-level approaches to social inclusion focus on intentional consultation and engagement with participants (Assefa et al., 2021; Narula, 2018; Wicken et al., 2008). Specific participatory methods include door-to-door household visits, which can reach people who are unable to attend or be heard during community-wide activities; group-specific activities, which can help identify the relative importance of WASH challenges for different groups; and encouraging participation in community-wide events in culturally appropriate ways (Caruso et al., 2021; Routray, Torondel, Clasen, et al., 2017; White et al., 2016). Properly implemented inclusion of marginalized populations can incorporate their specific contributions and needs and can enable greater social equity and leadership, in addition to greater service access (Grant et al., 2017; H. Jones, n.d.; MacArthur et al., 2020; Wilbur & Huggett, 2015; Willetts et al., 2010, 2009). In particular, inclusive WASH programs have improved women's confidence and

community respect as decision-makers (Aladuwaka & Momsen, 2010, as cited by Caruso et al., 2021).

Water and Sanitation Process Evaluations

With the movement towards transformative WASH interventions, there are calls for more comprehensive evaluation of such interventions (Cumming et al., 2019; French et al., 2021; Haque & Freeman, 2021; Pickering et al., 2019). While outcome and impact evaluations predominate the literature, process evaluations are rarely used to examine WASH interventions (Haque & Freeman, 2021; Saunders et al., 2005). Process evaluations can assess if interventions were designed and implemented as planned, as they can help distinguish between intended and delivered program components (Saunders et al., 2005). Process evaluations also assist with the interpretation of intervention outcomes, which can provide context for future programs' development and scaling up (Linnan & Steckler, 2002). Among the few water and sanitation process evaluations in the literature, only a handful have identified factors that affected participation and assessed participant reactions to the intervention (Boisson et al., 2014; Routray, Torondel, Jenkins, et al., 2017; Sclar et al., 2022).

Saunders et al.'s process evaluation framework provides a systematic guide to formatively and summatively assess the implementation of health interventions (2005). The framework's process indicators include: fidelity (extent to which an intervention adheres to its design), dose delivered (quantity of intervention components given to participants), dose received (extent of participant engagement and satisfaction with an intervention), reach (proportion of target audience that participates), recruitment (methods to attract participants),

and context (social and environmental characteristics that may influence outcomes) (Linnan & Steckler, 2002; Saunders et al., 2005).

As a process indicator, participation (reach) evaluates the extent to which an intervention is received by a group of interest (Linnan & Steckler, 2002; Saunders et al., 2005). Participant socio-demographic characteristics, such as age, gender, race, ethnicity, and income and education levels, are important to identify as certain subgroups may be overrepresented among participants (Linnan & Steckler, 2002). Another process indicator, dose received, evaluates the extent to which participants engage with an intervention, as well as what participants think about an intervention. Saunders et al. refer to these two elements of dose received as participant "exposure" and "satisfaction," respectively. Dose received is an important indicator because it assesses intervention quality and acceptability from the perspectives of the populations of interest.

Participation in water and sanitation process evaluations (reach)

Several methods have been used to assess reach within process evaluations of WASH interventions. Sclar et al.'s mixed-methods process evaluation of a sanitation behavior change intervention in Odisha, India assessed reach as the proportion of the target population (latrine-owning households) who attended participatory activities. The study determined that 93.1% (N=1975) of target households attended at least one activity, with household-level activities being the highest attended and community meetings being moderately attended. Across all activities, the intervention reached the subgroups of interest (women, men, and children), supporting the study's implementation approach at the household, group, and community levels (Sclar et al., 2022).

Boisson et al.'s process evaluation of a latrine construction and use randomized control trial in Orissa, India found that community reach was minimal. Many of the intervention's community-level participatory activities were either not held at all or involved minimal participation outside of village water committee members. The study highlighted the discrepancy between the intervention guidelines and what was implemented and suggested that the subsidy-based intervention needed improved community mobilization coverage (Boisson et al., 2014).

Routray et al. conducted a process evaluation of community mobilization activities for latrine promotion in India. As a purely qualitative study, it did not assess participation as a proportion of the target population who attended intervention activities. Instead, the study analyzed participation descriptively through observations, focus groups, and in-depth interviews. Their findings indicated that door-to-door household visits were particularly successful at reaching women compared to larger village meetings. Without quantitative data, it is difficult to determine the scale of the household consultations and other activities' reach. However, the qualitative data provided important insights into the social dynamics at community-level events and how they limited the participation of lower caste households and women (Routray, Torondel, Clasen, et al., 2017).

Process evaluations can examine barriers to participation in addition to determining community reach. Reported challenges can provide additional context around participant recruitment and reach (Baranowski & Stables, 2000; Linnan & Steckler, 2002)**.** For example, Sclar et al. reported that primary challenges to recruitment and community-level participation were the program's lack of incentives, social dynamics, and poor weather conditions that affected

26% of all activities (Sclar et al., 2022). Boisson et al.'s study also identified barriers to participatory activities, which included community apathy and lack of cooperation from village committee members (Boisson et al., 2014). Additionally, Routray et al.'s qualitative study found that the main barriers to intervention participation were caste and gender-based exclusion at the community-level.

Dose received in water and sanitation process evaluations

As with reach, process evaluations of WASH interventions have used varying approaches to measure dose received. Sclar et al.'s process evaluation collected satisfaction data through activity observation debriefs, where enumerators asked for participants' impression of the activity, as well as what helped or detracted from delivery. Participants reported a range of responses, with community-level performances eliciting positive reactions, and components of transect walks and community meetings evoking negative reactions among some participants. Based on those results, the process evaluation recommended that understanding the historical and political context of future intervention sites could address distrust participants may hold from prior sanitation interventions (Sclar et al., 2022). While Sclar et al. collected satisfaction as a qualitative measure of dose received, they did not assess participant's influence over the intervention components.

In contrast, Boisson et al.'s process evaluation quantitatively measured dose received as participant awareness of latrine promotion mobilization activities. The study found that almost none of the intervention households were aware of activities like transect walks or mapping exercises. These results contributed to the overall findings that there were substantial gaps between what was designed for India's Total Sanitation Campaign and what was actually

implemented in practice. Although the study asked participants if they had heard about the intervention activities, the study scope did not evaluate participation engagement or satisfaction with the activities as additional indicators of dose received (Boisson et al., 2014).

As identified by the literature, there are few quantitative process evaluations that assess participation, barriers to participation, and participant influence in intervention design (dose received) for water and sanitation interventions. Comparing participation and dose received for intervention activities is important to evaluate the coverage and the quality of intervention components and to better inform future implementation.

There is a particular need for water and sanitation process evaluations in urban informal settlements, as these environments present complex environmental and health challenges and are increasingly the focus of innovative WASH interventions. One such intervention is Revitalizing Informal Settlements and their Environments, or RISE, which is implementing water-sensitive infrastructure and behavior change components with urban informal settlements in South-East Asia and in the Pacific. This sub-study is a process evaluation of the design phase of RISE that will contribute to the knowledge of participation and community influence for water-sensitive participatory activities.

Sub-study Background

Revitalizing Informal Settlements and their Environments

Revitalizing Informal Settlements and their Environments (RISE) is trialing a localized, water-sensitive intervention to upgrade informal settlements in Suva, Fiji and Makassar, Indonesia. The intervention focuses on improving water use and quality and reducing environmental contamination and flooding by (1) integrating nature-based solutions and (2)

facilitating non-infrastructure and behavior change elements with communities. The physical infrastructure includes wetlands, biofiltration gardens, and wetpods to reduce exposure to fecal contamination. The primary aims of the RISE trial are to assess the impact of the intervention on environmental conditions, human health, and individual and community well-being (Leder et al., 2021).

Co-design activities: Intervention design

Participatory co-design activities were developed to meaningfully engage communities in the design of RISE infrastructure at the settlement level (co-design workshops) and at the household level (household consultations). By doing so, RISE aimed to use a participatory process to develop socio-culturally and biophysically relevant revitalization that combined lived community experiences with RISE system knowledge. The planned main output of the co-design process was a confirmed Concept Plan for each intervention settlement's water-sensitive upgrade that would inform a Detailed Engineering Plan. To better facilitate and implement the water-sensitive upgrading, the RISE co-design process encompassed six key considerations: meaningfully reach everyone through co-design, involve diverse stakeholders, engage technical and social knowledge, protect vulnerable people and environments, recognize land rights, and center co-design on the local community (Prescott et al., 2021).

These considerations represent RISE's intentions for inclusive and meaningful community participation and influence. RISE co-design activities intended to engage residents, with an emphasis on including potentially marginalized people, including women, the elderly, ethnic and religious minorities, and people living with disabilities, who have specific needs and knowledge related to water and sanitation. To ensure that participants would be heard through

the co-design process, activities were developed to account for social hierarchies, power dynamics, and vulnerabilities. The participatory activities were designed for community members to have influence in the decision-making process by encouraging sharing of water issues, broader village challenges, and preferences for upgrades. Bi-directional discussion and understanding among participants and RISE staff were intended to improve intervention design and implementation. Given this approach, it was anticipated that participants would have a voice over RISE decision-making in their communities. It was also intended that the context-specific Concept Plans directly relate to each settlement by meeting expressed needs and creating a common value (Prescott et al., 2021).

Co-design workshops and household consultations were intended to facilitate two phases of participatory activities in Makassar and in Suva. The first phase was designed to build understanding and to present options for settlement upgrades. RISE staff aimed to facilitate a series of activities for participants to share information about their community and for participants to learn about the water-sensitive approach. Planned activities for the co-design workshops included focus groups to map important community features, community visioning sessions, discussions of upgrading design options, and markings of potential infrastructure in the community (Prescott et al., 2021).

Mapping exercises were designed for participants to identify positive and negative aspects about their environment (areas for shade and crop production, flood-prone areas), access and transportation networks (vehicle access, footpaths), community spaces (gathering spaces, markets), and water and sanitation (water sources, houses with poor sanitation). Sessions on RISE design options were developed to share information with whole communities

about the water-sensitive upgrades, including their scope, how infrastructure components work, and operations and maintenance. These information sessions aimed to strengthen communities' informed decision making around design choices. Community visioning sessions were planned for participants to share what they would like their community to be in the future. RISE facilitators would then link their aspirations to the RISE intervention to foster a shared value between community members and the project system. Outings to mark potential infrastructure locations were developed for participants and RISE staff to spatialize water-sensitive infrastructure in communities and to discuss options for households' service clustering. The marked locations were key to informing draft Concept Plans and therefore required representation from all participating households (Prescott et al., 2021).

In addition to co-design workshop activities, household consultations were planned to discuss individual household conditions and preferences for the water-sensitive infrastructure connection. Primary discussion topics included communal infrastructure (e.g., wetland location), in addition to private infrastructure (e.g., placement of pipes and toilets). RISE staff also planned to discuss infrastructure operations and maintenance with household members. These consultations aimed to reach all households, including those who did not attend or who were overlooked during the co-design workshops. Decision-making at the household level was intended to be incorporated into the Concept Plan (and later into the Detailed Engineering Design) so that household-level choices would be implemented as planned (Prescott et al., 2021).

After phase one, phase two aimed to review co-design options and refine each settlement's Concept Plan. Meetings were planned to present the draft Concept Plan and gain

feedback from community members, local governance, and agency stakeholders. Any changes were to be incorporated before the Concept Plan moved into its next stage (Detailed Engineering Design). RISE planned to confirm consent at community and household levels for the Concept Plan, as well as connection to the RISE system. Operations and maintenance roles and responsibilities were also planned to be agreed upon by communities, local government, and service agencies prior to the confirmed Concept Plan (Prescott et al., 2021).

Co-design activities: Intervention implementation

The RISE co-design process was implemented in Makassar from April to October 2019, and in Suva from September 2020 to January 2021. In Makassar, the co-design process was called PANRITA (*PerencanAN RI kampung TA,* or 'planning in your neighborhood'), and lasted between two to six weeks in each settlement. Prior to PANRITA, meetings were held with community members (including KePoLink, *Kelompok Pengelola Lingkungan*, or community liaisons with RISE), leaders, and elders to discuss previous water programing, as well as minority groups within the community. These discussions helped tailor how PANRITA activities were implemented for the larger community, especially around sensitive topics. During PANRITA, focus groups were used to have discussions amongst women and men separately. This format was used to further facilitate women's participation in design decision-making. At the end of PANRITA, a Concept Plan (also considered the RISE Infrastructure Map) and a Community Map were prepared for each community. The Community Map, in particular, was put together to showcase each community's values and visioning and to demonstrate that the RISE team heard what was important to them. Representatives from local government and service agencies were

invited to PANRITA's third phase to reinforce their roles and responsibilities alongside community members (Prescott et al., 2021).

Prior to the co-design phase in Suva, community members were consulted by RISE staff to help tailor the participatory activities for each settlement. Each settlement had elected a Community Engagement Council (CEC) earlier in the RISE intervention. All CEC members were invited to a series of pre-co-design workshops at Fiji National University to help decide on the workshop format (e.g., which days and what time of day) and to provide input on co-design activities based on settlements' contexts (e.g., physical space and social dynamics) (Prescott et al., 2021; Revitalizing Informal Settlements and their Environments, 2021).

Unlike Makassar, co-design workshops in Suva were held under COVID-19 conditions. Given this, only one representative from each household was asked to attend the co-design workshops. Households could choose who would represent them, and the representative could change based on who was available for each workshop event (e.g., morning events versus evening events). The co-design workshops were split into four steps: mapping the community, understanding the RISE system, understanding water connections, and infrastructure marking. Activity formats included information sessions, large discussion groups, focus groups, and groups clustered by house location. Local government representatives and service agencies (Water Authority of Fiji) participated during workshop activities to demonstrate their involvement and to build community trust. After each co-design workshop, a second, smaller co-design workshop was held for those who could not attend the earlier sessions (Prescott et al., 2021; Revitalizing Informal Settlements and their Environments, 2021).

Methods

Study design

Revitalizing Informal Settlements and their Environments (RISE) is a cluster randomized control trial currently operating across a total of 24 informal settlements in Makassar, Indonesia and Suva, Fiji. In each country, six settlements were randomly allocated to the RISE intervention, with the remaining six control settlements to be offered the intervention after the trial ends (Leder et al., 2021). The RISE intervention uses a water-sensitive cities approach, which focuses on improving water use and quality and reducing environmental contamination and flooding. The primary aims of RISE are to assess the impact of the intervention on environmental conditions, human health, and individual and community well-being (Leder et al., 2021).

The design of the water-sensitive infrastructure involved a participatory process, through which intervention communities in Makassar and Suva co-designed socially and biophysically appropropriate, site-specific infrastructure. Social and gender inclusion during co-design was prioritized for the activities, with both countries intending to reach primary groups and enabling participant engagement during the participatory process (Leder et al., 2021). In Makassar, co-design workshops were held from April to October 2019, and in Suva, workshops were held from September 2020 to January 2021. This study is a cross-sectional sub-study of RISE, which had completed participatory co-design activities at the time of data collection in Makassar and in Suva, but had not yet started construction of physical infrastructure.

Sampling

Informal settlements in urban areas of Makassar and Suva were selected for the parent RISE study based on community willingness and commitment to participate; settlement size, location, and demographics; and environmental and construction-related conditions. Covariate-constrained randomization was then used to allocate settlements to the intervention and control groups. The Makassar intervention and control groups were balanced on the number of children aged under 5 years, flood risk, and asset ownership score. In addition to these three factors, the Suva intervention and control groups were balanced on site contamination grouping, or risk categories for environmental fecal contamination. Heads of households provided written informed consent at baseline in 2018. Consent to the intervention was independent of consent to participation in additional surveys and sampling (Leder et al., 2021).

This sub-study used quantitative data from surveys that targeted households that had previously enrolled and consented in intervention and control settlements in Makassar and Suva. Two adult survey respondents, one man and one woman, were targeted from each household. The first respondents targeted by enumerators were household members who had participated in the most recent RISE survey. If the first respondent was not available, enumerators asked to talk with “an adult who is able to answer questions about the health and activities of the whole household.” An adult was defined in RISE as someone 18 years or older, or who was married, or who had children. Enumerators then targeted second household respondents as any adult of the opposite gender. Respondents were considered a non-response

after three calls for phone surveys in Makassar and two household visits for in-person surveys in Fiji. This non-response procedure followed RISE protocol (Salinger et al., 2022).

The survey collected data in all 24 intervention and control sites, however, this process evaluation sub-study used survey data from intervention sites only, since co-design was implemented only in these settlements. One of the six Makassar intervention sites was excluded from the sub-study's analytic sample because residents were deliberating about withdrawing from the parent RISE trial at the time. The sub-study analytic sample consisted of 320 surveys (185 with women and 135 with men) from 5 sites in Makassar and 503 surveys (254 with women and 249 with men) from 6 sites in Suva (Salinger et al., 2022).

Data collection

Prior to data collection, local field teams in Makassar and Suva participated in survey administration training. In Makassar, local enumerator teams collected survey data using SurveyCTO by phone from September to November 2020, using participant phone numbers that had been collected previously by RISE. If household phone numbers were missing in Makassar, enumerators asked established community representatives, neighbors, or extended family members for phone numbers. In Suva, local field teams administered surveys in-person from October 2020 to January 2021 (Salinger et al., 2022).

The survey tool included sections relating to self-reported participation in various RISE activities and perceived influence in program-related decision-making (see Appendix for complete survey questions and response options). The participation and influence questions are relevant to this sub-study because RISE intended to include diverse community participation and for participants to have meaningful involvement over RISE decisions that would affect their

households and larger community. These questions also address Saunders et al.'s process evaluation indicators for reach and dose received. Participation-related questions asked respondents which RISE activities they participated in and their barriers to participation if they did not participate in any RISE activities. Questions on perceived influence asked how much influence respondents and their households felt they had experienced over RISE decision-making, along with how much influence respondents and their households would have preferred. Influence questions were asked regardless of whether the respondent had participated in RISE activities or not. The survey tool also collected respondents' disability status (including vision, hearing, mobility, cognition, self-care, and communication difficulties) using the Washington Group on Disability Statistics' short set of questions on functioning (Washington Group, 2020). Other participant socio-demographic data that was used for analysis (gender, age, education level, disability status, marital status, ethnicity, religion, and asset ownership) was collected from earlier RISE surveys.

Translation of the survey tool was first from English into Bahasa Indonesia, iTaukei (Fijian), and Fijian Hindi. The tool was then back-translated into English independently for translation accuracy. Before use in the sub-study, the survey was piloted in multiple sites in Indonesia and Fiji (Salinger et al., 2022).

Data analysis

Analysis was conducted separately by country because of differences in intervention timelines, survey data collection methods, and socio-cultural contexts. Two primary activities (co-design workshops and household consultations) were selected for analysis, because they

were main components of RISE's participatory design phase. All other RISE activities were considered secondary activities.

Participation (reach)

Participation for all RISE activities and for primary co-design activities (co-design workshops and household consultation) was determined by calculating binary (yes/no) response frequencies. Pearson chi-square tests of independence were performed to test the associations between respondents' socio-demographic characteristics (gender, education, disability, ethnicity, religion, and marital status) and their participation in co-design workshops and in household consultations. Two-sample t-tests were completed to test the sample means by age between those who participated and those who did not participate in co-design workshops and household consultations.

Logistic regression was used to compute the odds ratios (and 95% confidence intervals) of participation in co-design workshops and household consultations for socio-demographic predictors, including gender, education, disability, ethnicity, religion, marital status, age, and asset ownership score. Logistic models were first fit with individual covariates to analyze estimated coefficients, standard errors, and likelihood ratio tests for the covariate significance. Individual covariates were selected for full models if their coefficient p-value was less than 0.25 (Bursac et al., 2008). Full models were compared to reduced intermediate models with dropped individual covariates to assess the nested intermediate models' likelihood ratio tests. Final models included covariates with significant ($p<.05$) nested intermediate model likelihood ratio tests.

Barriers to participation

Frequencies of barriers to participation were calculated for respondents who did not participate in any RISE activity. Because of the limited sample size, we chose not to conduct any type of inference testing on the sub-sample who did not participate in any RISE activities.

Influence (Dose received)

Cross tabulations of experienced and desired levels of influence were calculated for respondents who participated in at least one primary co-design activity. Pearson chi-square tests of independence were performed, for the overall sample and for gender-stratified samples, to examine the relationship between experienced levels of influence and preferred levels of influence.

All analyses were performed in Stata (version 17).

Ethics

RISE is led by Monash University and has ethics approval from the Monash University Human Research Ethics Committee (Melbourne, Australia; protocol 9396), Universitas Hasanuddin (Makassar, Indonesia; protocol UH18020110), and Fiji National University (Suva, Fiji; protocol 137.19). The parent study included Emory University researchers in IRB applications prior to data collection. This sub-study did not require IRB approval because it is an analysis of secondary data; no primary data collection was performed.

Results

This chapter summarizes process evaluation findings for RISE co-design participation (reach), barriers to participation, and influence (dose received). The results are organized by country, with Makassar results first, followed by Suva results. Table 1 outlines the socio-demographic characteristics of Makassar and Suva survey respondents.

Table 1. Socio-demographic characteristics of Makassar and Suva respondents

	Makassar (n=320)		**Suva** (n=503)	
Variables	**n**	**%**	**n**	**%**
Gender				
Women	185	57.81%	254	50.50%
Men	135	42.19%	249	49.50%
Total	320	100%	503	100%
Education				
Primary and below	137	43.22%	78	17.37%
Secondary and above	180	56.78%	371	82.63%
Total	317	100%	449	100%
Disability				
No	305	95.31%	493	98.21%
Yes	15	4.69%	9	1.79%
Total	320	100%	502	100%
Ethnicity				
Other	80	25.24%	103	21.82%
Makassarese|iTaukei	237	74.76%	369	78.18%
Total	317	100%	472	100%
Marital status				
Other	44	13.88%	128	27.12%
Married	273	86.12%	344	72.88%
Total	317	100%	472	100%
Religion				

Other	26	8.20%	74	15.74%
Muslim|Christian	291	91.80%	396	84.26%
Total	317	100%	470	100%
Age	**n**	**Mean (SD)**	**n**	**Mean (SD)**
	320	39.48 (12.20)	502	42.24 (14.25)

Missing observations for Makassar:
1 (0.31%) missing for participation in Makassar co-design activities
2 (0.63%) missing for each: education, ethnicity, marital status, and religion
Missing observations for Suva:
3 (0.60%) missing for participation in Suva co-design activities
52 (10.14%) missing for education
1 (0.20%) missing for both disability and age
29 (5.77%) missing for both ethnicity and marital status
31 (6.19%) missing for religion

Who participated in Makassar RISE co-design activities? (Reach)

Table 2.1 outlines respondent participation in any RISE activity during the intervention's planning and participatory phases. Of the 319 survey respondents in Makassar, 283 (89%) participated in at least one RISE activity, and 36 (11%) did not participate in any RISE activities. Among the 283 who did participate in at least one RISE activity, 260 (92%) participated in at least one primary co-design activity, while the remaining 23 (8%) did not participate in primary co-design activities (Table 2.2). The 23 that did not participate in primary co-design activities participated in secondary RISE activities: 15 (65%) participated in household data collection for blood or stool samples (or other surveys), 8 (35%) participated in household measurements, 3 (13%) participated in follow-up consent, and 1 (4%) participated in community co-design consent; none reported participating in the randomization workshop. Of the 260 respondents who participated in at least one primary co-design activity, 200 (77%) participated in both

PANRITA (Makassar co-design workshops) and household consults, 31 (12%) participated in just household consults, and 29 (11%) participated in just PANRITA (Table 2.2).

Table 2.1. Makassar participation in any RISE activities	**n**	**%**
Participated in at least 1 RISE activity	283	88.71%
Did not participate in any RISE activities	36	11.29%
Total	**319**	**100%**

Missing observations:
1 (0.31%) for participation in co-design workshops and household consultations

Table 2.2. Makassar participation in primary RISE co-design activities	**n**	**%**
Participated in at least 1 primary co-design activity	260	91.87%
Participated in secondary activities only	23	8.13%
Total	**283**	**100%**
Participated in both PANRITA and household consults	200	76.92%
Participated in just household consults	31	11.92%
Participation in just PANRITA	29	11.15%
Total	**260**	**100%**

Table 3 details descriptive statistics and bivariate associations between participation in PANRITA and socio-demographic variables. Among the 184 women respondents for whom participation data was available, 146 (79%) participated, while among the 135 men, 83 (52%) participated. Among the 273 married respondents, 203 (74%) participated, while among the 44 respondents who reported other marital statuses, 24 (55%) participated. Women were significantly more likely to participate in PANRITA than men (X^2 (1, n=319) = 20.27, p<.001), and married people were significantly more likely to participate in PANRITA than unmarried people (X^2 (1, n=317) = 7.32, p=.007). The mean age among respondents who participated in PANRITA

was significantly older (M=40.56 years, SD=11.34) than among respondents who did not participate (M=36.84 years, SD=13.90) (t(317) = -2.47, p=.014).

There was no significant difference in PANRITA participation by education (X^2 (1, n=317) = 2.47, p=.116), disability (X^2 (1, n=319) = 0.02, p=.892), ethnicity (X^2 (1, n=317) = 3.25, p=.071), or religion (X^2 (1, n=317) = 2.70, p=.100). Of the 15 respondents who were categorized as having a disability, 11 (73%) reported that they participated in PANRITA.

Table 3. Makassar participation in PANRITA (co-design workshops) by socio-demographic characteristics

Variables	No	Yes	Total	Pearson Chi-square test of independence
Gender (n=319)				
Women	38 42.22%	146 63.76%	184 57.68%	χ^2 (1) = 20.27
Men	52 57.78%	83 36.24%	135 42.32%	p < .001
Education (n=317)				
Primary or below	32 35.56%	105 46.26%	137 43.22%	χ^2 (1) = 2.47
Secondary or above	58 64.44%	122 53.74%	180 56.78%	p = .116
Disability (n=319)				
No	86 95.56%	218 95.20%	304 95.30%	χ^2 (1) = 0.02
Yes	4 4.44%	11 4.80%	15 4.70%	p = .892
Ethnicity (n=317)				
Other	29 32.22%	51 22.47%	80 25.24%	χ^2 (1) = 3.25
Makassar	61 67.78%	176 77.53%	237 74.76%	p = .071
Marital Status (n=317)				
Other	20 22.22%	24 10.57%	44 13.88%	χ^2 (1) = 7.32
Married	70 77.78%	203 89.43%	273 86.12%	p = .007
Religion (n=317)				
Other	11 12.22%	15 6.61%	26 8.20%	χ^2 (1) = 2.70
Muslim	79 87.78%	212 93.39%	291 91.80%	p = .100
				Independent two-sample t-test
Age (n=319)				

Table 3. Makassar participation in PANRITA (co-design workshops) by socio-demographic characteristics

Variables	No	Yes	Total	Pearson Chi-square test of independence
Years	36.84 (13.90)	40.56 (11.34)	39.48 (12.20)	t (317) = -2.47 p = .014

Missing observations:
1 (0.31%) missing for participation in co-design workshops
2 (0.63%) missing for each: education, ethnicity, marital status, and religion

Table 4 outlines descriptive statistics and bivariate associations between participation in household consultations and respondent socio-demographic characteristics. Similar to PANRITA, among the 184 women respondents, 151 (82%) participated in household consultations, while among the 135 men, 80 (59%) participated. Among 273 married respondents, 209 (77%) participated, while among the 44 respondents with other marital statuses, 22 (50%) participated. Women were significantly more likely to participate in household consultations than men (X^2 (1, n=319) = 20.27, p<.001), and married respondents were significantly more likely to participate than unmarried respondents (X^2 (1, n=317) = 13.53, p<.001). The mean age among respondents who participated in household consultations was significantly older (M=41.32, SD=11.63) than among respondents who did not participate (M=34.77, SD=12.49) (t(317) = -4.40, p<.001).

Participation in household consultations did not significantly differ by education (X^2 (1, n=317) = 2.47, p=.116), disability (X^2 (1, n=319) = 0.45, p=.501), ethnicity (X^2 (1, n=317) = 0.01, p=.931), or religion (X^2 (1, n=317), p=.663).

Table 4. Makassar participation in household consultations by socio-demographic characteristics

	No	Yes	Total	Pearson Chi-square test of independence
Gender (n=319)				
Women	33 37.50%	151 65.37%	184 57.68%	X2 (1) = 20.27
Men	55 62.50%	80 34.63%	135 42.32%	p < .001
Education (n=317)				
Primary or below	31 36.05%	106 45.89%	137 43.22%	X2 (1) = 2.47
Secondary or above	55 63.95%	125 54.11%	180 56.78%	p = .116
Disability (n=319)				
No	85 96.59%	219 94.81%	304 95.30%	X2 (1) = 0.45
Yes	3 3.41%	12 5.19%	15 4.70%	p = .501
Ethnicity (n=317)				
Other	22 25.58%	58 25.11%	80 25.24%	X2 (1) = 0.01
Makassar	64 74.42%	173 74.89%	237 74.76%	p = .931
Marital Status (n=317)				
Other	22 25.58%	22 9.52%	44 13.88%	X2 (1) = 13.53
Married	64 74.42%	209 90.48%	273 86.12%	p < .001
Religion (n=317)				
Other	8 9.30%	18 7.79%	26 8.20%	X2 (1) = 0.19
Muslim	78 90.70%	213 92.21%	291 91.80%	p = .663
				Independent two-sample t-test
Age (n=319)				
Years	34.77 (12.49)	41.32 (11.63)	39.48 (12.20)	t (317) = -4.40
				p < .001

Missing observations:
1 (0.31%) missing for participation in household consultations
2 (0.63%) missing for each: education, ethnicity, marital status, and religion

Table 5 shows the results of a multivariable logistic regression model with participation in PANRITA as the dependent variable and gender, ethnicity, marital status, and age as independent variables. The adjusted odds of participation were 2.63 for women compared to

men (95% CI: 0.23, 0.64); 1.85 for Makassarese compared to minority ethnicities (95% CI: 1.04, 3.30); and 2.14 for married individuals compared to unmarried individuals (95% CI: 1.04, 4.36). For every one year increase in age in years, the adjusted odds of participation increased by 3% (95% CI: 1.00, 1.05).

Table 5. Makassar predictors of participation in PANRITA (co-design workshops)

Variables	Odds ratio	[95% confidence interval]
Gender	0.38	0.23 0.64
Ethnicity	1.85	1.03 3.30
Marital status	2.14	1.05 4.36
Age	1.03	1.00 1.05

Overall model: n = 317, likelihood ratio chi-square (4) = 28.33, p<.001
Missing observations: 1 (0.31%) missing for participation in co-design workshops, 2 (0.63%) missing for both ethnicity and marital status

Table 6 shows the results of a multivariable logistic regression model with participation in household consultations as the dependent variable and gender, marital status, and age as independent variables. The adjusted odds of participation were 3.57 times for women compared to men (95% CI: 0.16, 0.48) and 3.09 for married individuals compared to unmarried individuals (95% CI: 1.44, 6.67). For every one year increase in age in years, the adjusted odds of participation increased by 5% (95% CI: 1.02, 1.07).

Table 6. Makassar predictors of participation in household consultations

Variables	Odds ratio	[95% confidence interval]
Gender	0.28	0.16 0.48
Marital status	3.09	1.43 6.66
Age	1.05	1.02 1.07

Overall model: n = 317, likelihood ratio chi-square (3) = 49.43, p<.001
Missing observations: 1 (0.31%) missing for participation in household consultations, 2 (0.63%) missing for marital status

What were the primary barriers to participation in Makassar?

Table 7 shows the reported barriers to participation among those who did not participate in any Makassar RISE activities. Of the 36 respondents who did not participate in any RISE activity (primary or secondary), 29 (81%) respondents said that they were too busy with work, housework, or school to participate, 2 (6%) reported that they were not invited by RISE to participate, 2 (6%) did not want to participate in RISE activities, and 3 (8%) reported that there were other reasons for why they did not attend.

Table 7. Makassar barriers to participation in any RISE activities

Reported barriers	n	%
Too busy with work, housework, or school	29	80.56%
Did not want to participate	2	5.56%
Not invited by RISE	2	5.56%
Could not participate without assistance	0	0.00%
Other	3	8.33%
Total	36	100%

How did experienced levels of influence align with preferred levels of influence in Makassar? (Dose received)

Table 8.1 reports experienced and preferred levels of influence for RISE decision-making among Makassar respondents who participated in at least one primary co-design activity. Among the 245 respondents who participated in at least one primary co-design activity and responded to both influence questions, 63 (26%) reported experiencing no influence, 44 (18%) reported experiencing a little influence, and 138 (56%) reported having a lot of influence. When comparing experienced and preferred levels of influence, 161 (66%) respondents reported that their experienced influence matched with their preferred level of influence, 51 (21%) would

have preferred to have had more influence than they experienced, and 33 (14%) would have preferred to have had less influence than they experienced (n=245).

Of the 63 who reported having experienced no control over RISE decision-making, 26 (41%) would have preferred to have more influence, and among the 44 who reported having experienced a little control, 25 (57%) wanted more control.

Table 8.1. Experienced and preferred levels of influence over Makassar RISE decision-making among participants in at least one primary co-design activity

	Preferred Level of Influence				
	No control/ influence	**A little control/ influence**	**A lot of control/ influence**	**Total**	**Chi-square test of independence**
Experienced Level of Influence					
No control/ influence	37 58.73%	14 22.22%	12 19.05%	63 100.00%	
A little control/ influence	0 0.00%	19 43.18%	25 56.82%	44 100.00%	X2(4) = 124.15
A lot of control/ influence	3 2.17%	30 21.74%	105 76.09%	138 100.00%	p<.001
				245 100.00%	

Missing observations:
7 (2.70%) missing from experienced level of influence
8 (3.08%) missing from preferred level of influence

Table 8.2 outlines influence results for women respondents who participated in at least one primary co-design activity. Among the 152 women respondents with complete influence data, 39 (26%) reported experiencing no influence over RISE-related decision-making, 30 (20%) reported experiencing a little influence, and 83 (55%) reported a lot of influence. When comparing experienced and desired levels of influence, 97 (64%) reported that their experienced level of influence matched their preferred level of influence, 36 (24%) would have preferred to have had more influence, and 19 (13%) would have preferred to have had less

influence (n=152). Among the 39 women who reported having no control, 19 (49%) would have preferred to have had more control, and among the 30 women reported having a little control, 17 (57%) would have preferred to have had more control.

Table 8.2. Experienced and preferred levels of influence over Makassar RISE decision-making among women who participated in at least one primary co-design activity

	Preferred Level of Influence								
	No control/ influence		A little control/ influence		A lot of control/ influence		Total		Chi-square test of independence
Experienced Level of Influence									
No control/ influence	20	51.28%	8	20.51%	11	28.21%	39	100.00%	
A little control/ influence	0	0.00%	13	43.33%	17	56.67%	30	100.00%	X2 (4) = 64.80
A lot of control/ influence	2	2.41%	17	20.48%	64	77.11%	83	100.00%	p<.001
							152	100.00%	

Missing observations:
5 (3.09%) missing from both experienced level of influence and from preferred level of influence

Table 8.3 reports mens' experienced and preferred levels of participation in RISE-related decision-making. Among the 93 men respondents with complete influence data, 24 (26%) reported experiencing no influence, 14 (15%) reported experiencing a little influence, and 55 (59%) reported experiencing a lot of control. When comparing experienced levels of influence with preferred levels of influence, 64 (69%) reported that their experienced and preferred levels of influence matched, 15 (16%) would have preferred to have had more influence, and 14 (15%) would have preferred to have had less influence. Among the 24 men who reported having no control, 7 (29%) would have preferred to have had more control, while among the 14 men who reported having a little control, 8 (57%) would have preferred to have had more control.

Table 8.3. Experienced and preferred levels of influence over Makassar RISE decision-making among men who participated in at least one primary co-design activity

	Preferred Level of Influence								
	No control/ influence		A little control/ influence		A lot of control/ influence		Total		Chi-square test of independence
Experienced Level of Influence									
No control/ influence	17	70.83%	6	25.00%	1	4.17%	24	100.00%	X2 (4) = 61.31 p<.001
A little control/ influence	0	0.00%	6	42.86%	8	57.14%	14	100.00%	
A lot of control/ influence	1	1.82%	13	23.64%	41	74.55	55	100.00%	
							93	100.00%	

Missing observations:
2 (2.04%) missing from experienced level of influence
3 (3.06%) missing from preferred level of influence

Who participated in Suva co-design activities? (Reach)

Table 9.1 reports respondent participation in any Suva RISE activities during the intervention's planning and participatory phases. Of the 500 survey respondents for whom we had participation data, 375 (75%) participated in at least one RISE activity (including primary co-design and secondary activities), and 125 (25%) did not participate in any RISE activities. Among the 375 participants who participated in at least one RISE activity, 301 (80%) participated in at least one primary co-design activity, and 74 (20%) participated in only secondary co-design activities (Table 9.2). Of the 74 who only participated in secondary RISE activities, 36 (49%) reported participating in follow up consent, 30 (41%) reported participating in other survey collections (including for blood or stool samples), 13 (18%) participated in household measurements, and 8 (11%) participated in the randomization workshop; none participated in community co-design consent.

Among the 301 respondents who participated in at least one primary co-design activity, 196 (65%) participated in both co-design workshops and household consultations, 99 (33%) participated in just co-design workshops, and 6 (2%) participated in just household consultations (Table 9.2).

Table 9.1. Suva participation in any RISE activities	**n**	**%**
Participated in at least 1 RISE activity	375	75.00%
Did not participate in any RISE activities	125	25.00%
Total	**500**	**100%**

Missing observations:
3 (0.60%) for participation in co-design workshops and household consultations

Table 9.2. Suva participation in primary RISE co-design activities	**n**	**%**
Participated in at least 1 primary co-design activity	301	80.27%
Participated in secondary activities only	74	19.73%
Total	**375**	**100%**
Participated in both co-design workshops and household consults	196	65.11%
Participated in just co-design workshops	99	32.89%
Participated in just household consults	6	1.99%
Total	**301**	**100%**

Table 10 reports descriptive statistics and bivariate associations between participation in co-design workshops and respondent socio-demographic variables. People with disabilities were significantly less likely to participate in co-design workshops than people without disabilities (X^2 (1, n=499) = 8.74, p=.003). Of the 9 respondents who were categorized as having a disability, 1 (11%) reported that they participated in co-design workshops. There was no significant difference in co-design workshop participation by gender (X^2 (1, n=500) = 3.13),

p=.007), education (X^2 (1, n=448) = 0.71, p=.401), ethnicity (X^2 (1, n=471) = 0.003, p=.958), marital status (X^2 (1, n=471) = 3.68, p=.055), religion (X^2 (1, n=469) = 0.001, p=.972), or age (t (1, n=497) = -1.20, p=.231).

Table 10. Suva participation in co-design workshops by socio-demographic characteristics

	No	Yes	Total	Pearson Chi-square test of independence
Gender (n=500)				
Women	94 45.85%	159 53.90%	253 50.60%	X2 (1) = 3.13 p = .077
Men	111 54.15%	136 46.10%	247 49.40%	
Education (n=448)				
Primary or below	35 19.23%	43 16.17%	78 17.41%	X2 (1) = .71 p = .401
Secondary or above	147 80.77%	223 83.83%	370 82.59%	
Disability (n=499)				
No	196 96.08%	294 99.66%	490 98.20%	X2 (1) = 8.74 p = .003
Yes	8 3.92%	1 0.34%	9 1.80%	
Ethnicity (n=471)				
Other	42 21.99%	61 21.79%	103 21.87%	X2 (1) = .003 p = 0.958
iTaukei	149 78.01%	219 78.21%	368 78.13%	
Marital Status (n=471)				
Other	61 31.94%	67 23.93%	128 27.18%	X2 (1) = 3.68 p = .055
Married	130 68.06%	213 76.07%	343 72.82%	
Religion (n=469)				
Other	30 15.71%	44 15.83%	74 15.78%	X2 (1) = .001 p = .972
Christian	161 84.29%	234 84.17%	395 84.22%	
				Independent two-sample t-test
Age (n=499)				
Years	41.31 (16.17)	42.88 (13.00)	42.24 (14.35)	t (497) = -1.20 p = 0.231

Missing observations:
3 (0.60%) missing from participation in Suva co-design activities
52 (10.14%) missing from education
1 (0.20%) missing from both disability and age

29 (5.77%) missing from both ethnicity and marital status
31 (6.19%) missing from religion

Table 11 reports descriptive statistics and bivariate associations between participation in household consultations and socio-demographic variables. Respondents with a primary education or below were significantly less likely to participate than those with a secondary education or above (X^2 (1, n=488) = 4.32, p=.038). Household consultations captured 24 (31%) of those who had a primary education or below (n=78), and 161 (43%) of the people who had a secondary school education or above (n=370). There was no significant difference in household consultation participation by gender (X^2 (1, n=500) = 0.11, p=.744), disability (X^2 (1, n=499) = 3.28, p=.070), ethnicity (X^2 (1, n=471) = 0.40, p=.527), marital status (X^2 (1, n=471) = 2.46, p=.117), religion (X^2 (1, n=469) = 0.99, p=.319), or age (t (n=497) = -0.14, p=.554).

Table 11. Suva participation in household consults by socio-demographic characteristics

	No	Yes	Total	Pearson Chi-square test of independence
Gender (n=500)				
Women	149 50.00%	104 51.49%	253 50.60%	X2 (1) = .11 p = .744
Men	149 50.00%	98 48.51%	247 49.40%	
Education (n=448)				
Primary or below	54 20.53%	24 12.97%	78 17.41%	X2 (1) = 4.32 p = .038
Secondary or above	209 79.47%	161 87.03%	370 82.59%	
Disability (n=499)				
No	289 97.31%	201 99.50%	490 98.20%	X2 (1) = 3.28 p = .070
Yes	8 2.69%	1 0.50%	9 1.80%	
Ethnicity (n=471)				
Other	58 20.86%	45 23.32%	103 21.87%	X2 (1) = .40 p = .527
iTaukei	220 79.14%	148 76.68%	368 78.13%	
Marital Status (n=471)				

Other	83 29.86%	45 23.32%	128 27.18%	X2 (1) = 2.46
Married	195 70.14%	148 76.68%	343 72.82%	p = .117
Religion (n=469)				
Other	40 14.39%	34 17.80%	74 15.78%	X (1) = .99
Christian	238 85.61%	157 82.20%	395 84.22%	p = .319
				Independent two-sample t-test
Age (n=499)				
Years	42.16 (15.28)	42.34 (13.01)	42.24 (14.35)	t (497) = -.14
				p = .554

Missing observations:
3 (0.60%) missing from participation in Suva household consultations
52 (10.14%) missing from education
1 (0.20%) missing from both disability and age
29 (5.77%) missing from both ethnicity and marital status
31 (6.19%) missing from religion

Table 12 shows the results of a logistic regression model with participation in Suva co-design workshops as the dependent variable and disability as the independent variable. The odds of participation were 0.83 times for residents who reported having one or more disabilities compared to residents who reported not having a disability (95% CI: -4.57, -0.40).

Table 12. Suva predictors of participation in co-design workshops

Variable	Odds ratio	[95% confidence interval]
Disability	0.83	-4.57 -0.40

Overall model: n = 499, likelihood ratio chi-square (1) = 9.24, p = .002
Missing observations: 3 (0.60%) missing from participation in co-design workshops, 1 (0.20%) missing from disability

Table 13 reports the results of a logistic regression model with participation in Suva household consultations as the dependent variable and education level as the independent variable. The odds of participation were 1.73 times for residents who had a secondary level

education or higher compared to residents who had a primary level education or lower (95% CI: 0.03, 1.07).

Table 13. Suva predictors of participation in household consultations

Variable	Odds ratio	[95% confidence interval]
Education	1.73	0.03 1.07

Overall model: n = 448, likelihood ratio chi-square (1) = 0.035, p = .007
Missing observations: 3 (0.60%) missing from participation in household consultations, 52 (10.14%) missing from education

What were the barriers to participation in Suva?

Table 14 reports the barriers of participation to any RISE activity in Suva. Of the 125 respondents who did not participate in any RISE activity (primary or secondary), 107 (86%) said that they were too busy with work, housework, or school to participate, 9 (7%) said that they were not invited by RISE, 6 (5%) said that they could not participate without assistance, 1 (1%) did not want to participate, and 2 (2%) said that there were other barriers to their participation.

Table 14. Suva barriers to participation in any RISE activities

Reported barriers	n	%
Too busy with work, housework, or school	107	85.65%
Not invited by RISE	9	7.20%
Could not participate without assistance	6	4.80%
Did not want to participate	1	0.80%
Other	2	1.60%
Total	125	100%

How did experienced levels of influence align with preferred levels of influence in Suva? (Dose received)

Table 15.1 reports experienced and preferred levels of influence for RISE decision-making among Suva respondents who participated in at least one primary co-design activity. Among the 297 respondents who participated in at least one primary co-design activity and for whom experienced and preferred influence data were available, 31 (11%) reported experiencing no influence over RISE decision-making, 54 (18%) reported experiencing a little influence, and 212 (71%) reported experiencing a lot of influence. When comparing experienced and preferred levels of influence, 207 (70%) reported that their experienced and their preferred levels of influence matched, 27 (9%) would have preferred to have had more influence, and 63 (21%) would have preferred to have had less influence. Of the 31 who reported having experienced no control over RISE-related decisions, 18 (58%) would have preferred to have had more influence. Among the 54 respondents who reported having experienced a little control over RISE-related decisions, 9 (17%) would have preferred to have had more influence.

Table 15.1. Experienced and preferred levels of influence over Suva RISE decision-making among participants in at least one primary co-design activity

	Preferred Level of Influence								
	No control/ influence		A little control/ influence		A lot of control/ influence		Total		Chi-square test of independence
Experienced Level of Influence									
No control/ influence	13	41.94%	17	54.84%	1	3.23%	31	100.00%	
A little control/ influence	1	1.85%	44	81.48%	9	16.67%	54	100.00%	X2 (4) = 151.61
A lot of control/ influence	3	1.42%	59	27.83%	150	70.75%	212	100.00%	p<.001

	297	100.00%

Missing observations:
4 (1.33%) missing from experienced level of influence

Table 15.2 outlines influence results for women respondents who participated in at least one primary co-design activity. Among the 159 women respondents with complete influence data, 19 (12%) reported experiencing no influence over RISE-related decision-making, 31 (20%) reported experiencing a little influence, and 109 (69%) reported experiencing a lot of influence. When comparing experienced and preferred levels of influence, 107 (67%) reported that their experienced and preferred levels of influence matched, 21 (13%) would have preferred to have had more influence, and 31 (20%) would have preferred to have had less influence. Among the 19 women who reported having no control, 13 (68%) would have preferred to have had more influence, and among the 31 women who reported having a little control, 8 (26%) would have preferred to have had more influence.

Table 15.2. Experienced and preferred levels of influence over RISE decision-making among women who participated in at least one primary co-design activity

	Preferred Level of Influence								
	No control/ influence		**A little control/ influence**		**A lot of control/ influence**		**Total**		**Chi-square test of independence**
Experienced Level of Influence									
No control/ influence	6	31.58%	12	63.16%	1	5.26%	19	100.00%	
A little control/ influence	0	0.00%	23	74.19%	8	25.81%	31	100.00%	X2 (4) = 70.60 p<.001
A lot of control/ influence	1	0.92%	30	27.52%	78	71.56%	109	100.00%	
							159	100.00%	

Missing observations:
1 (0.63%) missing for experienced level of influence

Table 15.3 reports influence results for men who participated in at least one primary co-design activity. Among the 138 men with complete influence data, 12 (9%) reported experiencing no influence, 23 (17%) reported experiencing a little influence, and 103 (75%) reported experiencing a lot of influence. When comparing experienced and desired levels of experience, 100 (73%) reported that their experienced and preferred levels of influence matched, 6 (4%) would have preferred to have had more influence, and 32 (23%) would have preferred to have had less influence. Among the 12 men who reported having no influence, 4 (42%) would have preferred to have had more influence, and among the 23 men who reported having a little influence, 1 (4%) would have preferred to have had more influence.

Table 15.3. Experienced and preferred levels of influence over RISE decision-making among men who participated in at least one primary co-design activity

	Preferred Level of Influence								
	No control/ influence		A little control/ influence		A lot of control/ influence		Total		Chi-square test of independence
Experienced Level of Influence									
No control/ influence	7	58.33%	5	41.67%	0	0.00%	12	100.00%	
A little control/ influence	1	4.35%	21	91.30%	1	4.35%	23	100.00%	X2 (4) = 88.54
A lot of control/ influence	2	1.94%	29	28.16%	72	69.90%	103	100.00%	p<.001
							138	100.00%	

Missing observations:
3 (2.13%) missing for experienced level of influence

Discussion

The purpose of this RISE process evaluation sub-study was to assess participation, barriers to participation, and participant influence with a focus on gender and social inclusion for RISE participatory co-design activities (co-design workshops and household consultations) in Makassar and Suva. The co-design activities aimed to promote inclusive participation and engagement among intervention settlement residents. The results of this sub-study indicated that during implementation, the majority of respondents participated in at least one of the primary RISE co-design activities. Most primary audiences were reached, with notable exceptions for ethnic minorities, unmarried residents, and younger residents in Makassar and disabled residents and residents with less formal education in Suva. For those who did not participate in any RISE activities in either study site, the leading reported barrier was that respondents were occupied by other responsibilities. While the majority of co-design participants in both countries met their preferred level of influence over RISE decision-making, a substantial proportion of people who experienced no influence would have preferred to have had a higher level of influence.

Participation (reach) of co-design activities

As Saunders et al.'s process evaluation framework outlines, measuring reach can help determine if target groups were included in intervention components (Linnan & Steckler, 2002; Saunders et al., 2005). RISE co-design activities intended to engage residents, with an emphasis on reaching potentially marginalized groups, including women, the elderly, people living with disabilities, and minority ethnic and religious groups. During co-design implementation, primary groups were reached in both study sites, and co-design activities were particularly successful at

reaching women participants. Other socio-demographic characteristics predicted participation differentially in Makassar and Suva, offering insights for RISE co-design and future participatory activities.

Makassar participation

In Makassar, a large majority (89%) of survey respondents participated in at least one RISE activity, and most populations of interest were reached (women, the elderly, religious minorities, and residents with disabilities) in PANRITA and in household consultations. However, the two primary co-design activities were less successful in reaching men, younger residents, married residents, and in the case of PANRITA, residents from minority ethnic groups. Both primary RISE co-design activities were particularly successful in including women, as women were significantly more likely to participate than men. Household consultations, in particular, have been observed in other studies to be a successful approach to reach female participants (Routray, Torondel, Jenkins, et al., 2017). The PANRITA results for gender are also in contrast to a qualitative study of a sanitation intervention in India which found that community-level meetings may have been less effective in reaching women than men because of logistical and time barriers to their participation (De Shay et al., 2020). The participation findings indicate that RISE recruitment strategies and co-design workshop implementation successfully reached women in Makassar despite these potential barriers.

While the results from Makassar suggest that RISE co-design strategies were successful in including the aforementioned key groups, men, those identifying as ethnic minorities, younger residents, and unmarried residents were less likely to participate. Men had lower odds of participation in both co-design workshops and household consultations than women. From

initial RISE qualitative data collected after the co-design process, men reported that they considered elements of RISE activities feminine and that water and sanitation were domains for women (Revitalizing Informal Settlements and their Environments, 2021). This perception may have discouraged some men from participating in both PANRITA and household consultations.

In addition to participation for men, the odds of participation in PANRITA among ethnic minorities (Bugis, Toraja, Mandu, Luwu, Manggarai, Javanese, and mixed ethnicities, among others) were significantly lower than the odds of participation among Makassarese residents. In contrast to co-design workshops, ethnicity was not a significant predictor of participation for household consultations. The findings suggest that household consultations may be useful for reaching marginalized groups, including ethnic minorities, in settings where they are less likely to attend community-wide activities. The results from Makassar add to the evidence base of using house-to-house visits as a method for community inclusion (Routray, Torondel, Jenkins, et al., 2017).

Unmarried and younger residents in Makassar were also less likely to participate in both PANRITA and household consultations. A potential reason for these results could be that unmarried and younger residents were engaged with other work and less likely to be available for RISE co-design activities. Sclar et al.'s process evaluation of a sanitation intervention found that younger women, in particular, were frequently unable to attend women-specific activities. Instead, older women (48% > 40 years old and 36% > 45 years old), were more likely to participate (2022).

Suva participation

In Suva, three-quarters (75%) of respondents participated in at least one RISE activity, and most primary groups were reached (women, the elderly, and ethnic and religious minorities), with women being as likely to participate as men in both co-design workshops and household consultations. However, individuals with lower levels of completed education and those living with a disability were less likely to have participated. Overall, these results support the inclusive design of Suva's primary participatory activities for gender, in addition to age, and ethnic and religious background. An explanation for these results could be that the Fiji field team consulted with community groups (Community Engagement Councils and community representatives) and employed various strategies to include participants based on the communities' social dynamics. For example, separate co-design workshops were held in one settlement to accommodate the different kinship clans (*mataqali*) living there (Revitalizing Informal Settlements and their Environments, 2021). In some instances, Suva field teams held separate activities in Hindi (vs. iTaukei dialects) for Indo-Fijian residents, as well as second, smaller co-design workshops for households that were not able to participate in the main co-design workshop (Revitalizing Informal Settlements and their Environments, 2021). An additional reason for the participation results could be due to Fiji's COVID-19 conditions, under which most residents were at home and more available to participate in RISE activities.

While the results from Suva suggest that RISE co-design strategies were successful at including a majority of priority groups, disability status and education level were also predictors of participation. Residents who were living with a disability were less likely to participate in co-design workshops than residents without disabilities. One explanation for this finding could

be that people with disabilities were not prioritized by households as representatives for co-design workshops, given that RISE asked only one household member to attend each workshop activity as a COVID-19 precaution. Social exclusion of people with disabilities has been a barrier to their participation in WASH programming in other contexts (White et al., 2016). Another potential reason could be that co-design workshops were not able to accommodate disabilities (or adequately communicate how they could accommodate disabilities). Three out of five disabled residents who did not attend any RISE activities reported that they did not participate because they needed assistance. Physical, hearing, visual, and cognitive impairments have prevented participation in WASH intervention activities and accessing information (White et al., 2016).

For Suva household consultations, people who had primary-level education or lower were less likely to participate than those with secondary-level education or higher. One explanation for this result could be that households prioritized household members with higher formal education to participate in the door-to-door consultations. Research on the relationship between education level and decision-making has primarily focused on women. For example, higher education was associated with more autonomy over healthcare decision-making for women in Nepal (Acharya et al., 2010). The results from Suva suggest that intra-household dynamics may need to be considered when reaching groups of interest through household visits.

Influence (dose received) over RISE decision-making

Saunders et al.'s framework recommends use of the dose received indicator to evaluate participant engagement with an intervention. Engagement in this process evaluation was

informed by participants' self-reported experienced and desired influence over RISE decision-making. Through RISE co-design activities, it was intended for participants to to be meaningfully involved during intervention design and planning in their communities. During intervention implementation, the majority of co-design participants in both study sites met their preferred level of influence over RISE decision-making for their communities. Despite this finding, a substantial proportion of people (21% in Makassar and 9% in Suva) who participated in at least one primary activity would have preferred to have had a higher level of influence. Thus, participation in RISE co-design activities did not correspond with equitable decision-making influence across communities. More women than men reported wanting more decision-making influence in both Makassar (24% for women; 16% for men) and Suva (13% for women; 4% for men), especially among women who reported experiencing no influence at all. Inequitable decision-making has been reported by other studies, where socially excluded groups, including women, participated in water and sanitation design and planning, but did not feel like their voices were heard during intervention meetings (Assefa et al., 2021). Similarly, research has found that women were less likely to share ideas at community-wide events if men were also in attendance (Abu et al., 2019 and Routray, Toronel, Jenkins, et al., 2017, as cited by De Shay et al., 2020).

These results have implications for women's empowerment in co-design activities, as decision-making is considered to be a core part of women's agency (van Eerdewijk & Wong, 2017). Particularly in Makassar, our results indicate that women were more likely than men to participate in co-design activities, but also more likely to feel that their level of influence over decisions was lower than they would have preferred, suggesting that higher participation did

not necessarily equate to higher influence over decision-making. Research indicates that water and sanitation programming can help facilitate gender equity and shape power dynamics between women and men (Di, 2012; O'Reilly, 2010; Willetts et al., 2020, as cited by Leahy et al., 2017). In Fiji, a case study reported an increase in women's voice and influence at the community-level during water and sanitation interventions, a change that was seen as positive by most of the participating communities (Willetts et al., 2009). However, it has been advised that interventions specifically use empowering and participatory approaches to enable such changes, as women's influence can be limited if community power dynamics are not recognized (Ivens, 2008 and Kemerink et al., 2012, as cited by Leahy et al., 2017).

The influence findings also indicate the importance of using participant-reported influence (as a measure of dose received) to assess community engagement. Saunders et al.'s process evaluation framework defines dose received as the extent of community satisfaction and exposure, or the extent to which participants engage with intervention components. In practice, WASH process evaluations have also conceptualized dose received as participants' satisfaction with and awareness of intervention activities (Boisson et al., 2014; Sclar et al., 2021). Further, a systematic review of health promotion studies found that dose received has been used to assess attendance, completion of activities, and use of materials, among other applications (Rowbotham et al., 2019). This process evaluation expanded Saunders et al.'s definition of dose received to include participants' self-reported influence over decision-making. Doing so captured community members' engagement with co-design activities beyond satisfaction or intervention receipt. As co-design aims to meaningfully involve participants throughout the design cycle, influence appears to be an essential process indicator to measure.

Recommendations

From the sub-study findings, we provide recommendations for future participatory activities in WASH interventions and for process evaluations. For water and sanitation interventions, it is recommended that implementers conduct formative research and/or community engagement to understand context-specific social dynamics. Engaging with community groups can help determine what inclusive participation looks like in different settings and how inclusive participation can be best facilitated (Assefa et al., 2021; Wicken et al., 2008). Additionally, our influence findings indicate that many women did not achieve their desired level of influence, despite attending co-design activities. Given this, intervention activities that aim to meaningfully engage women should consider how to further enable their decision-making, in addition to increasing their recruitment and participation.

Process evaluations are essential to assess how interventions were delivered and received by participants (Haque & Freeman, 2021). This sub-study recommends that future WASH process evaluations include participant-reported influence as a key component of Saunders et al.'s dose received indicator to help determine community engagement. Assessments of participant control over decision-making can be particularly relevant for co-design processes to see if their approaches are promoting equitable community involvement in practice.

Strengths & Limitations

This process evaluation has a number of strengths. The research was nested within the larger RISE randomized control trial in intervention villages. Given this, survey enumerators had prior experience with RISE data collection methods and with community members, and

household contact information was available in Makassar from earlier phone surveys. In addition to data collector experience, many community members also had familiarity with RISE enumerators prior to data collection. Several limitations also exist for this process evaluation. During data collection, sampling bias may have occurred, as those who participated in co-design activities may have been more likely to respond to the sub-study survey. Recall bias also may have been present, as the Makassar survey was administered 11-13 months after the end of RISE's co-design phase. Lastly, social desirability bias may have influenced responses for barriers to participation. Depth of understanding would be improved with further qualitative analysis of participant experience with primary co-design activities.

Conclusion

Using a quantitative, framework-based process evaluation, this sub-study found that RISE co-design workshops and household consultations achieved adequate participation and dose received (influence). The majority of priority groups in Makassar and in Suva were reached, and the majority of respondents had their desired level of influence met. Both primary co-design activities were particularly successful in including women participants. The sub-study also discovered gender and social inequities in co-design participation and influence over decision-making, and recommends that water and sanitation interventions engage with communities in order to identify and appropriately include groups of interest in participatory activities. Future process evaluations are encouraged to assess participant-reported influence (as a measure of dose received) to better understand and promote community engagement.

References

Abu, T. Z., Bisung, E., & Elliott, S. J. (2019). What if your husband doesn't feel the pressure? An exploration of women's involvement in WaSH decision making in Nyanchwa, Kenya. *International Journal of Environmental Research and Public Health*, *16*(10), 1763. https://doi.org/10.3390/ijerph16101763

Acharya, D. R., Bell, J. S., Simkhada, P., van Teijlingen, E. R., & Regmi, P. R. (2010). Women's autonomy in household decision-making: A demographic study in Nepal. *Reproductive Health*, *7*(1), 15. https://doi.org/10.1186/1742-4755-7-15

Aladuwaka, S., & Momsen, J. (2010). Sustainable development, water resources management and women's empowerment: The Wanaraniya Water Project in Sri Lanka. *Gender and Development*, *18*(1), 43–58.

Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners*, *35*(4), 216–224. https://doi.org/10.1080/01944366908977225

Assefa, G. M., Sherif, S., Sluijs, J., Kuijpers, M., Chaka, T., Solomon, A., Hailu, Y., & Muluneh, M. D. (2021). Gender equality and social inclusion in relation to water, sanitation and hygiene in the Oromia Region of Ethiopia. *International Journal of Environmental Research and Public Health*, *18*(8), 4281. https://doi.org/10.3390/ijerph18084281

Baranowski, T., & Stables, G. (2000). Process evaluations of the 5-a-Day projects. *Health Education & Behavior*, *27*(2), 157–166.

Boisson, S., Sosai, P., Ray, S., Routray, P., Torondel, B., Schmidt, W.-P., Bhanja, B., & Clasen, T. (2014). Promoting latrine construction and use in rural villages practicing open defecation: Process evaluation in connection with a randomised controlled trial in

Orissa, India. *BMC Research Notes*, *7*(1), 486. https://doi.org/10.1186/1756-0500-7-486

Bradford, L. E. A., Vogel, T., Lindenschmidt, K.-E., McPhedran, K., Strickert, G. E. H., Fonstad, T. A., & Bharadwaj, L. A. (2018). Co-design of water services and infrastructure for Indigenous Canada: A scoping review. *FACETS*. https://doi.org/10.1139/facets-2017-0124

Bursac, Z., Gauss, C. H., Williams, D. K., & Hosmer, D. W. (2008). Purposeful selection of variables in logistic regression. *Source Code for Biology and Medicine*, *3*(1), 17. https://doi.org/10.1186/1751-0473-3-17

Caruso, B. A., Conrad, A., Patrick, M., Owens, A., Kviten, K., Zarella, O., Rogers, H., & Sinharoy, S. S. (2021). Water, sanitation, and women's empowerment: A systematic review and qualitative metasynthesis (p. 2021.10.26.21265535). medRxiv. https://doi.org/10.1101/2021.10.26.21265535

Cumming, O., Arnold, B. F., Ban, R., Clasen, T., Esteves Mills, J., Freeman, M. C., Gordon, B., Guiteras, R., Howard, G., Hunter, P. R., Johnston, R. B., Pickering, A. J., Prendergast, A. J., Prüss-Ustün, A., Rosenboom, J. W., Spears, D., Sundberg, S., Wolf, J., Null, C., … Colford, J. M. (2019). The implications of three major new trials for the effect of water, sanitation and hygiene on childhood diarrhea and stunting: A consensus statement. *BMC Medicine*, *17*(1), 173. https://doi.org/10.1186/s12916-019-1410-x

Dangour, A. D., Watson, L., Cumming, O., Boisson, S., Che, Y., Velleman, Y., Cavill, S., Allen, E., & Uauy, R. (2013). Interventions to improve water quality and supply, sanitation and hygiene practices, and their effects on the nutritional status of children. *The Cochrane Database of Systematic Reviews*, *8*, CD009382.

https://doi.org/10.1002/14651858.CD009382.pub2

Darvesh, N., Das, J. K., Vaivada, T., Gaffey, M. F., Rasanathan, K., Bhutta, Z. A., & Social Determinants of Health Study Team. (2017). Water, sanitation and hygiene interventions for acute childhood diarrhea: A systematic review to provide estimates for the Lives Saved Tool. *BMC Public Health*, *17*(Suppl 4), 776. https://doi.org/10.1186/s12889-017-4746-1

De Shay, R., Comeau, D. L., Sclar, G. D., Routray, P., & Caruso, B. A. (2020). Community perceptions of a multilevel sanitation behavior change intervention in rural Odisha, India. *International Journal of Environmental Research and Public Health*, *17*(12), 4472. https://doi.org/10.3390/ijerph17124472

Di, K. (2012). *Now we feel like respected adults: Positive change in gender roles and relations in a Timor-Leste WASH programme* (No. 6; ACFID Research in Development Series). ACT: International Women's Development Agency, WaterAid, and Australian Council for International Development.

Fiji Informal Settlement Situation Analysis. (n.d.). https://planning.org.nz/Attachment?Action=Download&Attachment_id=4128

French, M. A., Fiona Barker, S., Taruc, R. R., Ansariadi, A., Duffy, G. A., Saifuddaolah, M., Zulkifli Agussalim, A., Awaluddin, F., Zainal, Z., Wardani, J., Faber, P. A., Fleming, G., Ramsay, E. E., Henry, R., Lin, A., O'Toole, J., Openshaw, J., Sweeney, R., Sinharoy, S. S., … Leder, K. (2021). A planetary health model for reducing exposure to faecal contamination in urban informal settlements: Baseline findings from Makassar, Indonesia. *Environment International*, *155*, 106679. https://doi.org/10.1016/j.envint.2021.106679

Fuller, J. A., Clasen, T., Heijnen, M., & Eisenberg, J. N. S. (2014). Shared sanitation and the prevalence of diarrhea in young children: Evidence from 51 countries, 2001–2011. *The American Journal of Tropical Medicine and Hygiene*, *91*(1), 173–180. https://doi.org/10.4269/ajtmh.13-0503

George, A. S., Mehra, V., Scott, K., & Sriram, V. (2015). Community participation in health systems research: A systematic review assessing the state of research, the nature of interventions involved and the features of engagement with communities. *PLOS ONE*, *10*(10), e0141091. https://doi.org/10.1371/journal.pone.0141091

Gero, A., Kohlitz, J., & Willetts, J. (2017). *Informal settlements in the Pacific and links to sustainable development*. https://opus.lib.uts.edu.au/bitstream/10453/118057/1/Informal%20settlements%20in%20the%20Pacific%20and%20links%20to%20sustainable%20development.pdf

Grant, M., Willetts, J., Australian Water Partnership, Australia, & Department of Foreign Affairs and Trade. (2017). *Gender equality & goal 6: The critical connection*.

Haque, S. S., & Freeman, M. C. (2021). The Applications of Implementation Science in Water, Sanitation, and Hygiene (WASH) Research and Practice. *Environmental Health Perspectives*, *129*(6), 065002. https://doi.org/10.1289/EHP7762

Heijnen, M., Cumming, O., Peletz, R., Chan, G. K.-S., Brown, J., Baker, K., & Clasen, T. (2014). Shared sanitation versus individual household latrines: A systematic review of health outcomes. *PLOS ONE*, *9*(4), e93300. https://doi.org/10.1371/journal.pone.0093300

Hubbard, B., Sarisky, J., Gelting, R., Baffigo, V., Seminario, R., & Centurion, C. (2011). A community demand-driven approach toward sustainable water and sanitation

infrastructure development. *International Journal of Hygiene and Environmental Health*, *214*(4), 326–334. https://doi.org/10.1016/j.ijheh.2011.05.005

International Conference on Primary Health Care. (1978). *Declaration of Alma-Ata*.

Ivens, S. (2008). Does increased water access empower women? *Development*, *51*(1), 63–67. https://doi.org/10.1057/palgrave.development.1100458

James, A. (2014). *Assessing gender and social inclusion issues in urban water and sanitation in India*. 213. World Bank. http://pragmatix.org/wp-content/uploads/2020/04/WB-India-Gender-and-Social-Inclusion-in-Urban-WSS-Report-6-Feb-2014.pdf

Jiménez, A., LeDeunff, H., Giné, R., Sjödin, J., Cronk, R., Murad, S., Takane, M., & Bartram, J. (2019). The enabling environment for participation in water and sanitation: A conceptual framework. *Water*, *11*(2), 308. https://doi.org/10.3390/w11020308

Joint Monitoring Programme. (n.d.). *JMP household data*. Retrieved April 5, 2022, from https://washdata.org/data/household#!/dashboard/new

Jones, H. (n.d.). *Social inclusion in Malawi WASH project: Research report.* 59.

Jones, H., Fisher, R., & Reed, R. (2012). Water and sanitation for all in low-income countries. *Proceedings of the Institution of Civil Engineers, Municipal Engineer*, *165*(3), 167–174.

Jones, P. (2016). *The emergence of Pacific urban villages: Urbanization trends in the Pacific Islands*. Asian Development Bank.

Kahssay, H., & Oakley, P. (1999). *Community involvement in health development: A review of concept and practice*. World Health Organization.

Kemerink, J. S., Méndez, L. E., Ahlers, R., Wester, P., & van der Zaag, P. (2012). The question of

inclusion and representation in rural South Africa: Challenging the concept of water user associations as a vehicle for transformation. *Water Policy*, *15*(2), 243–257. https://doi.org/10.2166/wp.2012.127

Kimani-Murage, E. W., & Ngindu, A. M. (2007). Quality of water the slum dwellers Use: The case of a Kenyan slum. *Journal of Urban Health*, *84*(6), 829–838. https://doi.org/10.1007/s11524-007-9199-x

Leahy, C., Winterford, K., Nghiem, T., Kelleher, J., Leong, L., & Willetts, J. (2017). Transforming gender relations through water, sanitation, and hygiene programming and monitoring in Vietnam. *Gender & Development*, *25*(2), 283–301. https://doi.org/10.1080/13552074.2017.1331530

Leder, K., Openshaw, J. J., Allotey, P., Ansariadi, A., Barker, S. F., Burge, K., Clasen, T. F., Chown, S. L., Duffy, G. A., Faber, P. A., Fleming, G., Forbes, A. B., French, M., Greening, C., Henry, R., Higginson, E., Johnston, D. W., Lappan, R., Lin, A., … Brown, R. (2021). Study design, rationale and methods of the Revitalising Informal Settlements and their Environments (RISE) study: A cluster randomised controlled trial to evaluate environmental and human health impacts of a water-sensitive intervention in informal settlements in Indonesia and Fiji. *BMJ Open*, *11*(1), e042850. https://doi.org/10.1136/bmjopen-2020-042850

Lewis, E. W., Siyambango, N., & Lendelvo, S. (2018). Assessment of accessibility of safe drinking water: A case study of the Goreangab informal settlement, Windhoek, Namibia. *Water Practice and Technology*, *13*(4), 871–878. https://doi.org/10.2166/wpt.2018.096

Linnan, L., & Steckler, A. (2002). *Process Evaluation in Public Health Interventions and Research*. Jossey-Bass Publishers.

MacArthur, J., Carrard, N., & Willetts, J. (2020). WASH and Gender: A critical review of the literature and implications for gender-transformative WASH research. *Journal of Water, Sanitation and Hygiene for Development*, *10*(4), 818–827. https://doi.org/10.2166/washdev.2020.232

Madon, S., Malecela, M. N., Mashoto, K., Donohue, R., Mubyazi, G., & Michael, E. (2018). The role of community participation for sustainable integrated neglected tropical diseases and water, sanitation and hygiene intervention programs: A pilot project in Tanzania. *Social Science & Medicine*, *202*, 28–37. https://doi.org/10.1016/j.socscimed.2018.02.016

Moretto, L., Faldi, G., Ranzato, M., Rosati, F. N., Ilito Boozi, J.-P., & Teller, J. (2018). Challenges of water and sanitation service co-production in the global South. *Environment and Urbanization*, *30*(2), 425–443. https://doi.org/10.1177/0956247818790652

Morgan, L. M. (2001). Community participation in health: Perpetual allure, persistent challenge. *Health Policy and Planning*, *16*(3), 221–230. https://doi.org/10.1093/heapol/16.3.221

Narayanan, R., van Norden, H., Gosling, L., & Patkar, A. (2012). Equity and inclusion in sanitation and hygiene in South Asia: A Regional Synthesis. *IDS Bulletin*, *43*(2), 101–111. https://doi.org/10.1111/j.1759-5436.2012.00314.x

Narula, M. (2018). *The dynamic role of gender and social inclusion: Achieving internationally agreed water-related goals*. United Nations; United Nations. https://www.un.org/en/chronicle/article/dynamic-role-gender-and-social-inclusion-achieving-internationally-agreed-water-related-goals

Nelson, N., & Wright, S. (1995). *Power and participatory development: Theory and practice*. London: Intermediate Technology Publications [This first appeared in Vuori H, Hastings

JEF (eds). 1986. Patterns of community participation in community health care. Copenhagen: World Health Organization Regional Office for Europe.].

Nelson, S., Drabarek, D., Negin, J., & Abimbola, S. (2021). How community participation in water and sanitation interventions impacts human health, WASH infrastructure and service longevity in low-income and middle-income countries: A realist review. *BMJ Open*, *11*(12), e053320. https://doi.org/10.1136/bmjopen-2021-053320

Oakley, A., Strange, V., Bonell, C., Allen, E., Stephenson, J., & RIPPLE Study Team. (2006). Process evaluation in randomised controlled trials of complex interventions. *BMJ (Clinical Research Ed.)*, *332*(7538), 413–416. https://doi.org/10.1136/bmj.332.7538.413

O'Reilly, K. (2010). Combining Sanitation and women's participation in water supply: An example from Rajasthan. *Development in Practice*, *20*(1), 45–56.

Otsuka, Y., Agestika, L., Widyarani, Sintawardani, N., & Yamauchi, T. (2019). Risk factors for undernutrition and diarrhea prevalence in an urban slum in Indonesia: Focus on water, sanitation, and hygiene. *The American Journal of Tropical Medicine and Hygiene*, *100*(3), 727–732. https://doi.org/10.4269/ajtmh.18-0063

Pickering, A. J., Null, C., Winch, P. J., Mangwadu, G., Arnold, B. F., Prendergast, A. J., Njenga, S. M., Rahman, M., Ntozini, R., Benjamin-Chung, J., Stewart, C. P., Huda, T. M. N., Moulton, L. H., Colford, J. M., Luby, S. P., & Humphrey, J. H. (2019). The WASH Benefits and SHINE trials: Interpretation of WASH intervention effects on linear growth and diarrhoea. *The Lancet Global Health*, *7*(8), e1139–e1146. https://doi.org/10.1016/S2214-109X(19)30268-2

Pierce, J. L., Kostova, T., & Dirks, K. T. (2001). Toward a theory of psychological ownership in

organizations. *The Academy of Management Review*, *26*(2), 298–310. https://doi.org/10.2307/259124

Prescott, M. F., Spasojevic, D., Burge, K., Leersnyder, A., Ramirez-Lovering, D., & French, M. (2021). *Co-design of water sensitive settlement upgrading*. 52.

Prokopy, L. S. (2005). The relationship between participation and project outcomes: Evidence from rural water supply projects in India. *World Development*, *33*(11), 1801–1819. https://doi.org/10.1016/j.worlddev.2005.07.002

Ramsay, E. E., Fleming, G. M., Faber, P. A., Barker, S. F., Sweeney, R., Taruc, R. R., Chown, S. L., & Duffy, G. A. (2021). Chronic heat stress in tropical urban informal settlements. *IScience*, *24*(11), 103248. https://doi.org/10.1016/j.isci.2021.103248

Revitalizing Informal Settlements and their Environments. (2021). *RISE activity notes*. (Internal report).

Rifkin, S. B. (2003). A framework linking community empowerment and health equity: It is a matter of CHOICE. *Journal of Health, Population and Nutrition*, *21*(3), 168–180.

Rifkin, S. B. (2009). Lessons from community participation in health programmes: A review of the post Alma-Ata experience. *International Health*, *1*(1), 31–36. https://doi.org/10.1016/j.inhe.2009.02.001

Rifkin, S. B. (2014). Examining the links between community participation and health outcomes: A review of the literature. *Health Policy and Planning*, *29*(suppl_2), ii98–ii106. https://doi.org/10.1093/heapol/czu076

Routray, P., Torondel, B., Clasen, T., & Schmidt, W.-P. (2017). Women's role in sanitation decision making in rural coastal Odisha, India. *PLOS ONE*, *12*(5), e0178042.

https://doi.org/10.1371/journal.pone.0178042

Routray, P., Torondel, B., Jenkins, M. W., Clasen, T., & Schmidt, W.-P. (2017). Processes and challenges of community mobilisation for latrine promotion under Nirmal Bharat Abhiyan in rural Odisha, India. *BMC Public Health*, *17*(1), 453. https://doi.org/10.1186/s12889-017-4382-9

Rowbotham, S., Conte, K., & Hawe, P. (2019). Variation in the operationalisation of dose in implementation of health promotion interventions: Insights and recommendations from a scoping review. *Implementation Science*, *14*(1), 56. https://doi.org/10.1186/s13012-019-0899-x

Salinger, A., Charles, I., Bass, A., Francis, N., Nasir, S., Meo-Sewabu, L., Batagol, B., & Sinharoy, S. (2022). The relationship between participatory community engagement and social capital in a settlement-scale water and sanitation intervention in urban informal settlements in Suva, Fiji and Makassar, Indonesia. (In preparation).

Satterthwaite, D., Archer, D., Colenbrander, S., Dodman, D., Hardoy, J., Mitlin, D., & Patel, S. (2020). Building resilience to climate change in informal settlements. *One Earth*, *2*(2), 143–156. https://doi.org/10.1016/j.oneear.2020.02.002

Saunders, R. P., Evans, M. H., & Joshi, P. (2005). Developing a process-evaluation plan for assessing health promotion program implementation: A how-to guide. *Health Promotion Practice*, *6*(2), 134–147. https://doi.org/10.1177/1524839904273387

Schrecongost, A., & Wong, K. (2015). *Unsettled: Water and sanitation in urban settlement communities in the Pacific*. World Bank.

Schrecongost, A., Wong, K., Dutton, P., & Blackett, I. (2015). Delivering water and sanitation to

Melenesian informal settlements. *Water (Australia)*.

Sclar, G. D., Routray, P., Majorin, F., Udaipuria, S., Portela, G., Koehne, W. J., Nagel, C. L., Sola, S., & Caruso, B. A. (2022). Mixed methods process evaluation of a sanitation behavior change intervention in rural Odisha, India. *Global Implementation Research and Applications*. https://doi.org/10.1007/s43477-022-00035-6

Semba, R. D., de Pee, S., Kraemer, K., Sun, K., Thorne-Lyman, A., Moench-Pfanner, R., Sari, M., Akhter, N., & Bloem, M. W. (2009). Purchase of drinking water is associated with increased child morbidity and mortality among urban slum-dwelling families in Indonesia. *International Journal of Hygiene and Environmental Health*, *212*(4), 387–397. https://doi.org/10.1016/j.ijheh.2008.09.001

Shibata, T., Wilson, J. L., Watson, L. M., Nikitin, I. V., Ansariadi, La Ane, R., & Maidin, A. (2015). Life in a landfill slum, children's health, and the Millennium Development Goals. *Science of The Total Environment*, *536*, 408–418. https://doi.org/10.1016/j.scitotenv.2015.05.137

Sinharoy, S. S., & Caruso, B. A. (2019). On World Water Day, gender equality and empowerment require attention. *The Lancet Planetary Health*, *3*(5), e202–e203. https://doi.org/10.1016/S2542-5196(19)30021-X

Sinharoy, S. S., Pittluck, R., & Clasen, T. (2019). Review of drivers and barriers of water and sanitation policies for urban informal settlements in low-income and middle-income countries. *Utilities Policy*, *60*, 100957. https://doi.org/10.1016/j.jup.2019.100957

Slattery, P., Saeri, A. K., & Bragge, P. (2020). Research co-design in health: A rapid overview of reviews. *Health Research Policy and Systems*, *18*(1), 17.

https://doi.org/10.1186/s12961-020-0528-9

Sobsey, M. D., Handzel, T., & Venczel, L. (2003). Chlorination and safe storage of household drinking water in developing countries to reduce waterborne disease. *Water Science and Technology*, *47*(3), 221–228. https://doi.org/10.2166/wst.2003.0199

Stephens, A., Lewis, E. D., & Reddy, S. (2018). Towards an inclusive systemic evaluation for the SDGs: Gender equality, Environments and Marginalized voices (GEMs). *Evaluation*, *24*(2), 220–236. https://doi.org/10.1177/1356389018766093

Tinoco, M., Cortobius, M., Grajales, M. D., & Kjellén, M. (2014). Water Co-operation between Cultures: Partnerships with Indigenous Peoples for Sustainable Water and Sanitation Services. *Aquatic Procedia*, *2*, 55–62. https://doi.org/10.1016/j.aqpro.2014.07.009

Tritter, J. Q., & McCallum, A. (2006). The snakes and ladders of user involvement: Moving beyond Arnstein. *Health Policy*, *76*(2), 156–168. https://doi.org/10.1016/j.healthpol.2005.05.008

Turley, R., Saith, R., Bhan, N., Rehfuess, E., & Carter, B. (2013). Slum upgrading strategies involving physical environment and infrastructure interventions and their effects on health and socio-economic outcomes. *Cochrane Database of Systematic Reviews*, *1*. https://doi.org/10.1002/14651858.CD010067.pub2

United Nations. (n.d.). *SDG Indicators Database*. SDG Indicators Database. https://unstats.un.org/sdgs/dataportal/database

United Nations & United Nations International Children's Emergency Fund. (2021). *Progress on household drinking water, sanitation and hygiene 2000-2020: Five years into the SDGs*.

United Nations International Children's Emergency Fund East Asia & Pacific Regional Office.

(2021). *Progress on household water, sanitation, and hygiene: Pacific region and Pacific Islands 2000-2020*. washdata.org

United Nations. (2015). *Sustainable Development Goals*. https://www.un.org/sustainabledevelopment/

United Nations. (2019). *The sustainable development goals report 2019*. https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019.pdf

United Nations-Habitat. (2021). *SDG indicator metadata*. https://unstats.un.org/sdgs/metadata/files/Metadata-11-01-01.pdf

van Eerdewijk, A., & Wong, F. (2017). *White paper: A conceptual model of* women and girls' empowerment. 85.

Wali, N., Georgeou, N., Simmons, O., Gautam, M. S., & Gurung, S. (2020). Women and WASH in Nepal: A scoping review of existing literature. *Water International*, *45*(3), 222–245. https://doi.org/10.1080/02508060.2020.1754564

Washington Group. (2020). *Census Questions on Disability Endorsed by the Washington Group*. https://www.cdc.gov/nchs/data/washington_group/WG_Short_Measure_on_Disability.pdf

White, S., Kuper, H., Itimu-Phiri, A., Holm, R., & Biran, A. (2016). A Qualitative Study of Barriers to Accessing Water, Sanitation and Hygiene for Disabled People in Malawi. *PLOS ONE*, *11*(5), e0155043. https://doi.org/10.1371/journal.pone.0155043

Wicken, J., Verhagen, J., Sijbesma, C., Silva, C. D., & Ryan, P. (2008). *Beyond construction: Use by all - a collection of case studies from sanitation and hygiene promotion practitioners in*

South Asia. IRC International Water and Sanitation Centre and WaterAid. http://www.irc.nl/page/43966

Wight, D., & Obasi, A. (2003). Unpacking the 'black box': The importance of process data to explain outcomes. In *Effective Sexual Health Interventions*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198508496.003.0010

Wilbur, J., & Huggett, C. (2015). *WaterAid Bangladesh Equity and Inclusion Review* (p. 62). Water Aid.

Willetts, J., Carrard, N., Halcrow, G., Rowland, C., & Crawford, J. (2009). *How do we better address gender in Pacific water and sanitation initiatives? Fiji case study*. http://www.genderinpacificwash.info/system/resources/BAhbBlsHOgZmIjkyMDExLzAxLzExLzIxLzMyLzMyLzE2MC9pc2ZfaXdkYV9maWppX2Nhc2Vfc3R1ZHkucGRm/isf_iwda_fiji-case-study.pdf

Willetts, J., Halcrow, G., Carrard, N., Rowland, C., & Crawford, J. (2010). *Making the Invisible Visible: Gender and Pacific Water, Sanitation and Hygiene Initiatives*. 15.

World Bank. (1995). *Contribution of people's participation: Evidence from 121 rural water supply projects*. http://www.nzdl.org/cgi-bin/library.cgi?e=d-00000-00---off-0envl--00-0----0-10-0---0---0direct-10---4-------0-1l--11-en-50---20-about---00-0-1-00-0-0-11-1-0utfZz-8-00&a=d&c=envl&cl=CL1.1&d=HASH0161139fa7e42af4c91e8415.7

World Health Organization. (2018). *Guidelines on sanitation and health*. World Health Organization. https://apps.who.int/iris/handle/10665/274939

Yang, W., Roig, M., Ainbinder, L., Jimenez, M., Perry, J., & Haywood. (2016). *Leaving no one*

behind: The imperative of inclusive development. United Nations.

Appendix

Survey questions and response options for (1) RISE activity participation, (2) barriers to RISE activity participation, (3) experienced influence, and (4) preferred influence. Where different, response options are separated by study country.

1. Question: RISE activity participation	"Which of the following RISE activities did you personally participate in?"
Response options (Suva)	Randomization workshop
	Community co-design workshop for adults
	Household consultation (during which you were asked about the placement of pipes, toilets, pump, wetlands, septic tanks, as well as maintenance costs)
	Community co-design consent (during which connections were sprayed on the floor and wall and a picture was taken of the household representative with the marked connections)
	Follow-up consent (during which someone from the household signed on a map of the settlement to confirm their agreement to participate in RISE)
	Household data collection (during which RISE staff came to your house to take blood or stool or survey you or someone in your household)
	Household data collection (during which RISE staff came to take measurements of your house, pipes, and floor levels)
	Other
	None
	Don't know
	Refused to answer
	Question was not asked

2. Question: RISE activity participation	"Which of the following RISE activities did you personally participate in?"
Response options (Makassar)	Randomization workshop
	PANRITA workshop for adults
	PANRITA workshop for youth
	PANRITA workshop for children
	Household consultation (during which you were asked about the placement of pipes, toilets, pump, wetlands, septic tanks, as well as maintenance costs)
	Community co-design consent (during which connections were sprayed on the floor and wall and a picture was taken of the household representative with the marked connections)
	Follow-up consent (during which someone from the household signed on a map of the settlement to confirm their agreement to participate in RISE)
	Household data collection (during which RISE staff came to your house to take blood or stool or survey you or someone in your household)
	Household data collection (during which RISE staff came to take measurements of your house, pipes, and floor levels)
	Other
	None
	Don't know
	Refused to answer
	Question was not asked

3. Question: Barriers to participation	"What was the main reason you did not participate in any RISE activities"
Response options (both study countries)	S/he was not aware of any of these activities

	S/he was not invited by RISE to participate in any of these activities
	S/he was unable to participate in any of these activities because s/he was too busy with work, housework, or school
	S/he was unable to participate in any of these activities because her/his spouse or family would not allow it
	S/he was unable to participate in any of these activities because s/he could not participate without assistance (e.g., visual, hearing, mobility difficulties)
	S/he was unable to participate in any of these activities because s/he does not speak the language
	S/he did not want to participate in any of these activities
	We are renting our house
	Other
	Don't know
	Refused to answer
	Question was not asked

4. Question: Experienced influence	"How much influence do you feel you and your household had over the RISE-related decisions that will affect your household, cluster, or settlement?"
Response options (both study countries)	No control/influence
	A little control/influence
	A lot of control/influence
	Don't know
	Refused to answer
	Question was not asked

5. Question: Preferred influence	“How much influence would you and your household have preferred to have over the RISE-related decisions that will affect your household, cluster, or settlement?”
Response options (both study countries)	No control/influence
	A little control/influence
	A lot of control/influence
	Don’t know
	Refused to answer
	Question was not asked