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RESEARCH ARTICLE

Key mechanisms of a gender and socially inclusive community engagement and participatory design approach in the RISE program in Makassar, Indonesia and Suva, Fiji

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Abstract

Globally, more than one billion people live in urban informal settlements and experience suboptimal access to safe water, sanitation and hygiene (WASH). Participatory approaches are increasingly being promoted in WASH interventions, but the key elements of these approaches are not well-defined. The Revitalising Informal Settlements and their Environments (RISE) program launched in 2017 uses a participatory approach to co-design water-sensitive infrastructure with residents of 24 urban informal settlements in Makassar, Indonesia and Suva, Fiji. Our objective was to identify key mechanisms of a gender and socially inclusive participatory approach for engaging diverse people in RISE. We conducted and analysed semi-structured in-depth interviews (IDIs) with 49 RISE program staff; IDIs with 29 residents from RISE settlements in Indonesia and Fiji; and 6 focus group discussions (FGDs) with RISE residents in Fiji in 2020–2021, after participatory design activities were complete. Resident participants were purposively selected for representation of women and men; high and low participation in RISE; and different levels of disability/impairment. The question guides were informed by the Consolidated Framework for Implementation Research (CFIR), which defines 39 constructs (grouped into five domains) that describe an intervention. The IDI and FGD transcripts were analysed thematically with deductive codes based on the CFIR. For each of the five CFIR domains, the construct that was most relevant to mechanisms for the engagement of diverse people was used for the final analysis. The findings identified several key mechanisms for engaging diverse residents in programs like RISE. Four of these are recommended for future implementation and scale-ups of RISE and

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similar programs: engaging with residents at the household level (and potentially the individual level); incorporating flexibility and adaptability throughout the program; having a diverse team; and maintaining regular contact and positive rapport between the staff and participants.

1. Introduction

Globally, more than one billion people live in urban informal settlements and experience suboptimal access to safe water, sanitation and hygiene (WASH) [1]. In Suva, Fiji, overall urban access to water and safe sanitation are high, at 96% and 92% respectively [2]. However, for the 20% of the urban population who live in informal settlements, access is worse than average: 18% of households lack access to improved sanitation, 11% of households lack access to improved water, and most households are exposed to flooding, and lack access to drainage and solid waste management [3]. These consequences are experienced disproportionately by women [4]. Among urban dwellers in Indonesia, in 2017, 98% of the richest households, but only 59% of the poorest households, had access to at least basic water services, and basic sanitation was accessed by 99% of the richest and 91% of the poorest [5]. Within urban settlements, further inequities in access to safe WASH exist due to gender inequality and social exclusion of marginalised groups such as people with disabilities, elderly people and migrants [6].

Within community development broadly, participatory approaches were promoted by Chambers [7] among others because of an understanding that participants were experts on their own experiences and should therefore be part of the decision-making, planning and implementation of interventions that impacted them. These participatory approaches have been adopted to varying extents in WASH programming including in Fiji and Indonesia. For example, in urban informal settlements in Melanesia (including Fiji), participatory approaches helped participants 'accumulate practical authority' through the establishment of WASH collectives. Creating these committees strengthened a sense of authority that would be recognized by the government whilst encouraging more engagement from other residents who had witnessed the positive WASH outcomes made possible by these committees [8]. In another project, households in informal settlements in Fiji were invited to map the WASH system (including aspects of the local WASH market) in their settlement to identify WASH needs and assist with collective planning and actions [9, 10]. Similarly, in their report about participatory upgrading of informal settlements in Indonesia, Das and King [11] describe how Surabaya Strenkali People's Movement (Paguyuban Warga Strenkali Surabaya; PWSS), a civil society organisation formed between grassroots organisations devoted to improving squatters' shelter security in Surabaya's urban informal settlements, helped residents to improve access to water and solid waste disposal (among other improvements).

As part of this trend toward participatory approaches, Participatory Design (PD) is increasingly being promoted as part of 'transformative' WASH interventions. Sanders, Brandt and Binder [12] broadly define PD as the inclusion of non-designers (potential users or beneficiaries, other stakeholders and those on the project team who are from disciplines other than design, e.g. marketing) in various design activities. In their report of a PD approach to address water shortages in India, Varma et al. [13] explain that without PD, the needs of participants may not be properly identified (or fulfilled), therefore the resulting product may not be used or maintained properly.

Revitalising Informal Settlements and their Environments (RISE), launched in 2017, is a transdisciplinary, cluster randomized control trial which measures the impacts of

decentralised water-sensitive infrastructure, developed through PD, on physiological and social indicators of health and wellbeing among residents of 24 urban informal settlements in Makassar, Indonesia and Suva, Fiji [14]. Health, wellbeing and ecological data is regularly collected from residents and settlements for assessment of trial outcomes over a five-year period, known within RISE as 'assessment' activities [14]. PD approaches were used within each intervention settlement to 'promote engagement and informed decision-making with residents of each settlement, particularly emphasising participation by women, children, elderly, disabled and other groups that may have specific needs' [14, p6]. Design activities took place in six intervention sites in Indonesia in 2019 and in six intervention sites in Fiji in 2020. (The remaining six settlements in each country are control sites and will receive the intervention later.)

The design activities are described in detail elsewhere [1, 14] but, briefly, included three main steps. The first step was focused on preparing for the design activities and included conducting technical and community surveys in the project sites and establishing partnerships with residents, for example through setting up Community Engagement Councils (CECs), whose membership would ideally include representation from all 'gender and social groups'. The second step was focused on gathering information about residents' lived experiences and preferences for their settlements, homes and lifestyles to develop designs for the RISE infrastructure as well as build their capacity for ongoing community-led management. The activities sought to be inclusive of different genders and social groups. For example, the meeting location for the large-group workshop was a neutral space (a marquee constructed by the program staff) to ensure that as many people as possible felt they could attend, and there were household visits which meant that those who could not attend the larger workshops could still participate in the design activities. The activities also included activities such as *senam bersama* (group aerobics) which served to engage participants before the design-specific activities took place. The third step was to review and refine the co-design plans with the residents and other stakeholders and, again, the activities in this step sought to include the perspectives of diverse social groups through large-group meetings bringing different stakeholders together as well as household visits [1].

Whilst PD approaches are being adopted in WASH programs, the key elements of these approaches are not well-defined [15]. There are different tools for investigating and documenting interventions, and some (see Haque & Freeman [16] for example) have specifically called for more research in WASH which uses 'implementation science'. What sets implementation science apart from other tools that investigate the implementation aspects of interventions is that it is intended to 'promote the systematic uptake of research findings and other evidence-based practices into routine practice' [17 p1].

Hence, the aim of this study was to identify, using the Consolidated Framework for Implementation Research (CFIR), the key elements of a gender and socially inclusive community engagement and PD approach in the RISE program in Indonesia and Fiji, in order to document evidence-based practices that can be taken up in future WASH programs. Specifically, this study asked: 'What mechanisms were used to engage diverse people in RISE?', where 'diverse people' means people who might have specific needs such as women, men, children, older people and those with a disability. For this study, 'mechanisms' includes both 'activities' (specific events or tasks organised by the RISE program) and 'approaches' (ways of organising activities with respect to timing, group sizes, invitations to activities, access, staff rapport etc.) to engage diverse people (whether planned for or unintended). The distinction between 'activities' and 'approaches' is important because 'approaches' are general and can be applied to most interventions, regardless of context; whereas 'activities' are specific to context and extra care should be taken to make sure these are adapted appropriately.

2. Method

In this study, qualitative methods were used to capture the diverse perspectives of program staff and residents. Semi-structured in-depth interviews (IDIs) were conducted with 49 RISE program staff (based in Indonesia, Fiji, Australia and the USA) and 42 residents from RISE settlements in Indonesia and Fiji in addition to 12 focus group discussions (FGDs) with RISE residents in Fiji.

2.1. Ethics statement

Approval for the RISE trial and this study was obtained from the following universities and institutional review boards: University of the South Pacific, Monash University Human Research Ethics Committee (Melbourne, Australia; protocol 9396 and 22726), the Ministry of Research, Technology and Higher Education Ethics Committee of Medical Research at the Faculty of Medicine, Universitas Hasanuddin (Makassar, Indonesia; protocols UH18020110 and UH20050235), and the Fiji National University College Human Health Research Ethics Committee (CHREC ID 137.19).

Additional information regarding the ethical, cultural, and scientific considerations specific to inclusivity in global research is included in S1 Checklist.

2.2. Conceptual framework

The CFIR provides a structure for analysing interventions to verify 'what works where and why across multiple contexts' [18, p1]. Given that RISE operates across two country contexts and aims to engage diverse people, the CFIR is well suited to this study.

The CFIR defines five domains (which are further divided into 39 constructs, described in S1 Text) that describe an intervention: Intervention Characteristics, Outer Setting, Inner Setting, Characteristics of Individuals, and Process [18]. Whilst the CFIR was designed for use in clinical settings in high-income settings, it was intended to be adapted to different contexts [18]. The CFIR was adapted for this study in two ways. First, in a clinical setting, the distinction between the 'inner setting' (the implementing staff and organisations) and the 'outer setting' (the patients and the broader health care system) is quite clear. Due to the participatory nature of the RISE program whereby both staff and residents took on implementation roles, we chose to define several of the constructs from the 'Inner Setting' and 'Characteristics of Individuals' domains separately for the residents and the RISE program staff. For example, 'Culture' was split into two sub-constructs: Culture–settlements and Culture–RISE organisation.

Secondly, as is recommended by CFIR guidance [18], only those CFIR constructs that were most salient in relation to the research question were applied in this study. Most of the constructs were used to inform the design of the data collection tools (interview and FGD question guides) and the coding of the data. To streamline the findings, the results presented in this paper summarise the findings for the most salient construct (to the research question) per each of the five domains. The selection of the most salient construct per domain was based on the depth and breadth of data pertaining to the mechanisms for engaging diverse people in the RISE program collected under each construct. Most mechanisms identified appeared in more than one construct. The text segments for each construct were read carefully before the final construct under each domain was selected, to ensure that no substantial mechanisms were missed.

2.3. Sampling and recruitment

To enhance validity, a diverse range of participants were recruited for each data collection method. Participants for the **semi-structured IDIs with RISE staff** were purposively selected

[19] and invited through email to ensure a balance of perspectives across countries (Indonesia, Fiji, Australia and the USA); roles (including fieldworkers, administrative staff, researchers and the program leadership team); and genders. Staff IDIs were conducted between April 2020 and May 2021.

Data was collected with residents from the 12 intervention settlements in Fiji and Indonesia (six settlements in each country) after the completion of RISE design activities but prior to the construction of any new infrastructure. FGDs and IDIs were conducted in Fiji. In Indonesia, it was only possible to conduct IDIs (not FGDs) due to COVID-19 movement restrictions.

The **semi-structured IDIs with Indonesia residents** took place between November 2020 and January 2021. Participants were purposively selected for invitation, using data from prior RISE surveys, to achieve as much balance as possible with regard to: gender; functionality status as measured by the Washington Group Short Set questions [20]; level of participation in the RISE activities; and settlement.

The participants for the 12 **FGDs with Fiji residents** (one men's and one women's FGD from each of the six settlements) were invited (by letter) from a shortlist provided by community liaisons (two representatives or leaders from each settlement) who had been asked to identify several adults who had participated in most or all of the RISE design activities. The FGDs took place in November 2021 and each group included 6–15 participants.

Semi-structured IDIs with Fiji residents were conducted in November 2021 to capture the experiences of potentially marginalised residents. At the conclusion of each of the FGDs, the participants were asked to identify five people in their settlement who they thought might be marginalised; these lists were cross-checked with the community liaisons; and the study team identified four participants from each settlement (bar one settlement that had five) for invitation by letter. During the interview, the interviewer explained that they had been invited to participate because they had been identified as marginalised. It was clarified whether the participants *themselves* identified as being marginalised and if so, why.

2.4. Data collection

All IDI and FGD guides were informed by the CFIR, with particular focus on capturing data about the mechanisms for engaging diverse people in the RISE program. The questions derived from the CFIR were focused primarily on community needs and resources and RISE engagement mechanisms. Guides were adapted for each participant group. At the start of the FGDs, participants were also asked to free-list the RISE community engagement activities that they recalled being conducted in their settlement and then to rank these in order of how effective and useful these activities were in engaging diverse residents.

The question guides for the IDIs and FGDs with residents were reviewed with data collection teams in Fiji and Indonesia. The Indonesia and Fiji IDI guides were also piloted with resident participants. In Indonesia, the question guides were translated from English to Bahasa Indonesia and independently back-translated. All interviews were conducted in the language that best suited participants. If needed during the interviews, the interviewer would translate the questions from Bahasa Indonesia into Makassarese or Buginese. In Fiji, the question guides were in English and translated verbally by the interviewer into iTaukei or Fiji Hindi according to the needs of the participants.

Data was collected using different methods for each group. Staff interviews were conducted via Zoom, usually in a single session, with one or two participants, mostly by two interviewers, in English (with some interviews with Indonesian team members using participant translators). The Indonesian resident IDIs were conducted via phone (audio only) due to COVID-19 movement restrictions. These were conducted by members of the RISE Indonesia team in one

to three sessions per participant. Fiji resident FGDs and IDIs were carried out in person by the Fiji-based research team. Staff from the Fiji RISE team introduced the researchers to each settlement, after which refreshments and gifts were offered in accordance with *Vanua* methodology. (*Vanua* methodology is inclusive of how Fijians relate to each other and determines protocols of interaction. Observing *Vanua* methods means that research is done in a culturally safe environment [21, 22].) The team conducted the FGDs in one session each (with two researchers and two volunteers per group) and then the IDIs in one session each (with one researcher and one volunteer per participant).

All IDIs and FGDs were audio recorded. Transcription was done by a commercial transcription service (for RISE staff IDIs), by interviewers (for Indonesian resident IDIs) and by a university-based team (for the Fiji resident IDIs and FGDs). Translation into English, where necessary, was done by a university-based team (Indonesian and Fiji Hindi) or by the research team (iTaukei). Transcription and translation quality were achieved through checking a sample of interview transcripts and clarifying inconsistencies. All transcripts were de-identified prior to analysis.

2.5. Analysis

Each of the program staff and Indonesian resident interviews were included in the final analysis. A sample of the Fiji IDIs and FGDs were selected for the final analysis to balance the amount of data sourced from Fiji and Indonesia residents. Twelve of the Fiji IDIs were selected: one man and one woman from each of the settlements (bar one where only women were interviewed). Six of the twelve FGDs were selected: the men's and women's FGD from three of the settlements (total of 48 participants). The Fiji data collection team selected the sample based on the depth of response from the participants.

The data for this study was analysed thematically [23], using MAXQDA [24]. The codebook was drafted based on the 39 constructs of the CFIR and then refined through a memoing process (using a sample of five transcripts) where the constructs were grounded in the context of the RISE program by three of the researchers (NF, AB, IC). Intercoder agreement (checked qualitatively and quantitatively) [23, 25] was reached between the same three researchers after coding a further sample of four transcripts (coding separately and then meeting to compare the coded transcripts after each transcript). Once the codebooks were finalised, the transcripts were divided between the three researchers for analysis. The full codebook was used for staff data and a smaller subset of the codebook was used for resident data.

The text for each code (which corresponded to the contextualised CFIR constructs) was exported and organised by participant group. The text segments were read to identify and describe mechanisms for engaging diverse people in RISE (as well as potential barriers to engagement), and the responses from different participant groups were compared to examine patterns by sub-group. The results of this analysis were shared with members of the RISE Fiji and Indonesia teams in a series of contextualisation workshops as a form of participatory validation [26] prior to finalising the analysis.

3. Results

In-depth interviews were conducted with a total of 49 RISE program staff, 17 Indonesian residents and 25 Fiji residents, and 12 FGDs were conducted with Fiji residents (although only 12 Fiji IDIs and 6 Fiji FGDs were included in the final analysis). Demographic characteristics of the participants who were included in the analysis are shown in Table 1 below. The remainder of this section is organised to present results related to the single most relevant construct (to the research question) per each of the five domains of the CFIR.

Table 1. Participant list.

Individual Interview Participants	Indonesia residents (n = 17)		Fiji residents (n = 12)	
	count or avg	% or range	count or avg	% or range
# of settlements represented	5	-	6	-
Gender (Female) (n,%)	13	76.5	8	66.7
Age* (avg, range)	54.1	18.3–77.9	63.25	45–75
Ethnicity (n, %)	8 (Makassar)	47.1	5 (Indo-Fijian)	41.7
	6 (Bugis or Luwu)	35.3	7 (Itaukei)	58.3
	3 (Other)	17.6		
Religion (n, %)	15 (Islam)	88.2	2 (Hindu)	16.6
	2 (Minority group)	11.8	5 (Christian)	41.7
			5 (Unknown)	41.7
Person with a disability (n,%)				
Yes	8	47.1	3	25.0
No	8	47.1	5	41.7
Unknown	1	5.8	4	33.3
Marital Status (n,%)				
Married	12	70.6	3	25.0
Single/never married	2	11.8	1	8.3
Widower	0	0	4	33.3
Other	2	11.8	0	0
Unknown	1	5.8	4	33.3
Years lived in settlement (n,%)				
Up to 5 years	1	5.8	4	33.3
5–10 years	4	23.5	1	8.3
More than 10 years	2	11.8	6	50.0
Whole life	2	11.8	0	0
Unknown	8	47.1	1	8.3

Individual Interview Participants	RISE staff (n = 49)	
	count or avg	%
Gender (Female) (n,%)	26	53.1
Country office (n,%)		
Indonesia	13	26.5
Fiji	13	26.5
Australia/USA	23	47
Role (n,%)		
Project staff	40	81.6
Leadership	9	18.4

Focus Group Discussion Participants	Fiji (n = 48)	
	count or avg	% or range
# of settlements represented	3	-
Gender (Female) (n,%)	23	47.9
Age* (avg, range)	42.5	24–74
Ethnicity (n,%)		
Fiji Indian	7	14.6
Itaukei	39	81.2
Rotuman	1	2.1
Unknown	1	2.1

*Some age data is missing

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Table 2. Key mechanisms (activities and approaches) for engaging diverse people in RISE.

CFIR Domain and Construct	Activities	Approaches
Intervention Characteristics: Relativey Advantage	• household visits • special activities for children	• sought to be participatory and inclusive in its activities
Outer Setting: Resident Needs and Resources	• exercise for identifying, categorising and managing expectations related to resident needs • participatory infrastructure design (e.g., community mapping).	• flexibility of the RISE program to deliver extra benefits (outside of the program goals) in response to residents' needs
Inner Setting: Culture		• setting up program governance to reflect the value placed on the expertise and knowledge of residents and locally based staff • working toward having equal numbers of men and women on the program team and CECs • adapting settlement-level engagement activities to respond to existing power structures
Characteristics of Individuals: Knowledge and Beliefs about the Intervention	• various methods for maintaining regular contact with residents (in relation to both the assessment and participatory design activities) e.g., letters, household visits, community announcements, assessment activities	• the length and level of detail of the PD and engagement process needs to be adapted to the context where it is implemented, and time and resources should be allocated to supporting program staff to design the engagement process accordingly
Process: Engaging	• household visits • participatory design workshops • visits to the demonstration sites • group aerobics • special activities for children • free health checks for children as part of the assessment activities	• regular contact through multiple channels between program staff and residents • building good rapport and friendliness between staff and residents • providing incentives for participation in group activities • adapting the timing of activities to suit residents • running some activities in separate (e.g., women's, men's and youth) groups • running activities of different sizes e.g., whole community, group of 3–4 households, single household • providing transport to activities for those with mobility challenges • adapting communication styles to be more inclusive of elderly people • having residents translate during activities • voluntary participation

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The remainder of this section is organised to present results related to the most relevant construct (to the research question) per each of the five domains of the CFIR. Table 2 below summarises the activities and approaches identified under each construct.

Note that some of the activities and approaches refer to 'assessment' activities. While future scaled up RISE programming and similar WASH programs will not necessarily include a research component, they should incorporate 'assessment' in the form of monitoring and evaluation and these activities could replicate the assessment activities described here. Our analysis showed that implementation activities and assessment activities were inextricably linked from the perspective of the residents and that both impacted the ability for residents' needs and preferences to be reflected in PD. Therefore, we present both throughout, but clarify which activities were intended as 'assessment' activities.

3.1. Intervention characteristics: Relative advantage

The 'Intervention Characteristics' domain describes the key attributes of an intervention such as its adaptability, complexity, cost, and trialability. The construct 'Relative Advantage' is: 'Stakeholders' perception of the advantage of this intervention over an alternative solution' [27].

Each of the participant groups cited the participatory and inclusive nature of the RISE program as being a characteristic that set it apart from other interventions that aim to improve life in informal settlements. Many participants noted that RISE engages diverse groups of people, not just men:

> Usually, it is mostly men who speak up. But in the RISE activities it's different, because we give room to women, men, and the children to speak up.
>
> (female staff, Indonesia)

Several residents appreciated that, unlike other programs, the RISE team came to their houses one by one, which meant that everyone was included despite the heterogeneity of the settlements:

> Back in 2014 there was only one committee that organized our church meetings: this would be limited to church members. With the current committee under RISE they held interviews with every household.
>
> (female resident, Fiji)

Some of the Australia-based staff explained how the specific engagement of children in the Indonesian settlements had not only served to capture the perspectives of children, but also built trust with the residents in a context where a history of failed health and infrastructure interventions had eroded residents' faith in outside assistance:

> Starting the whole project with a children's session when we actually asked children "What do you think about this, where do you live?" [. . .] made their parents think differently about the project.
>
> (female staff, Australia)

Therefore, a key *approach* of the RISE program that provided a relative advantage for engaging diverse residents was that it **sought to be participatory and inclusive in its activities**. Key *activities* identified within the Relative Advantage construct included **household visits** and **special activities for children**.

3.2. Outer setting: Resident needs and resources

> *The 'Outer Setting' domain 'includes the economic, political, and social context within which an organization resides'. [13, p5]. The 'Patient Needs and Resources' construct describes 'the extent to which patient needs, as well as barriers and facilitators to meet those needs are accurately known and prioritized by the organization' [27]. (Note that in the RISE program, 'patients' refers to the residents of the settlements.)*

When comparing the needs of residents (in both Fiji and Indonesia) as identified by the staff versus the residents themselves, there was some consistency. The residents typically listed needs such as electricity, income, assistance with online learning from home during the COVID-19 pandemic, land security and better roads and pathways through their settlements. Some of the staff identified a few of these needs, including electricity, income and better access within the settlements, which they had learned through the household visits and community workshops. Where the staff and residents differed was the degree to which they felt that improvements to ecological and child health and wellbeing, flood management and access to water and sanitation were

important to the residents. Whereas the staff repeatedly mentioned these as a top priority for the residents, many of the residents only identified these as needs when prompted.

An Indonesian staff member described an activity that was designed specifically to elicit information about residents' needs. In the activity, groups of residents identified their needs and priorities, which the design team then categorised into three colour-coded groups: yellow for needs which RISE could meet; blue for needs which the residents could meet on their own; and white for needs for which they would need external help (e.g. government). This activity was useful for managing residents' expectations of the RISE program, encouraging them to organise settlement improvements independently, and to help the RISE staff understand the needs of diverse residents that were outside of the RISE program goals.

Several of the residents and staff described ways in which RISE had addressed some of the residents' needs that were outside of the main program goal. One such benefit included improved access through creating raised paths and roads (raising paths and roads was part of the original RISE program design to reduce flooding, but in some settlements the residents requested that this be done with more permanent materials and in additional locations because this improved access to and from as well as within the settlements). Another example was the provision of assistance in the form of food and hygiene products during the pandemic lock-downs, which was particularly appreciated by those with mobility challenges:

> They helped with the groceries twice, they gave us food two times
>
> (male resident, Fiji)

Several residents, particularly in Fiji, reflected that these extra benefits helped them to trust the RISE program.

There were also examples of the ways in which RISE was able to understand and be responsive to the priorities of diverse residents through the participatory infrastructure design process. For example, during the community mapping process there were:

> instances where a particular group of households talked about their future aspirations for access or for children's play spaces, space for children that could be tied into the way that that space–where that infrastructure went, firstly, and then how the materiality of that space was going to be.
>
> (female staff, Australia)

The **flexibility of the RISE program to deliver extra benefits (outside of the program goals) in response to residents' needs** was a key *approach* for engagement; particularly because this built the residents' trust in the program. This was possible because of the participatory nature of the program: uniting several agendas and reflecting on diverse needs made it possible to adjust designs so that multiple co-benefits were achieved within the overall design. Key *activities* for engaging diverse residents identified through the Resident Needs and Resources construct included an **exercise for identifying, categorising and managing expectations related to resident needs** as well as the **participatory infrastructure design (e.g. community mapping)**.

3.3. Inner setting: Culture

The 'Inner Setting' domain 'includes features of structural, political, and cultural contexts through which the implementation process will proceed' [13, p5]. The 'Culture' construct describes 'the norms, values, and basic assumptions of a given organization' [27].

The 'culture' construct was applied to the settlements as well as the RISE organisation, because —due to the participatory nature of the program—the residents are also implementers and therefore their settlements are part of the implementing organisation.

It was evident from some of the staff responses (from all countries) that a core value of RISE was to recognize the local knowledge and expertise of the residents as well as the Indonesia- and Fiji-based staff. For example, RISE set up community engagement committees (CECs), made up of residents, in each settlement to help facilitate the engagement process and the design activities. In addition, some of the Indonesia- and Fiji-based staff felt that there had been a shift over time in the value placed on their (staff members') expertise. In the beginning some of these staff felt that their ideas had not been taken seriously because the Australia- and USA-based staff were 'just using [them] as translators'. However, as the program progressed, they had more input and decision-making power. One of the Fiji-based staff said of the Australian/USA-based staff:

> they usually [. . .] take into consideration the values, the input the locals are putting into this RISE project, like listening to us—because of course we are the ones that are doing the hands-on job and we are the ones that know the Fijian context because we live here and we know.
>
> (male staff, Fiji)

Another male Fiji staff member felt that this was because 'since the COVID restriction, the [overseas] researchers are more dependent on me [because] they cannot travel'.

Staff across all locations described aspects of the norms, values and basic assumptions within the RISE team in relation to the inclusion of diverse people, with particular focus on gender equality, in the program team as well as the CECs and how this impacted the engagement of diverse residents. Several staff (from all offices) explained that recruiting equal numbers of women and men on the program teams was an important value of RISE and was promoted by program leadership. Some of the Australia-, USA- and Indonesia-based staff explained how the resulting gender diversity in the RISE teams impacted the perception of RISE by residents. For example, the gender of the field staff sometimes influenced the gender of the participants who chose to show up (that is, male residents showed up for male facilitators and vice versa).

The CECs were also a mechanism to better include diverse residents, though this mechanism also presented challenges. An Indonesian staff member explained that one of the ways in which the team sought to have gender balance within the CECs, or at least a balance of genders across the settlements was through a deliberate recruitment process. At the same time, participants from all the staff groups felt that sometimes the CEC structure perpetuated inequalities in the settlements because sometimes those who already had power and influence were prioritised for membership. Whilst this meant that sometimes existing inequalities and norms were not challenged, it was necessary to engage leaders or residents with existing power and influence (without whom, the program could not progress). Some of the Fiji staff noted that these inequalities were reduced somewhat once the community design workshops took place and all of the residents were able to communicate directly with RISE program staff (rather than only through the CEC members).

Representatives of each of the participant groups observed ways in which RISE adapted its engagement activities in response to norms and values in the settlements, particularly the existing power and governance structures. For example, in one settlement in Fiji, initially five separate CECs were set up because the settlement had five clans that preferred to work separately. Similarly, in some of the settlements in Fiji, the Fiji staff described how they had to work with

each of the church groups individually, or they would have excluded substantial parts of the community. In Indonesia, one of the residents who was a member of the CEC explained how he delivered messages about RISE to the community during religious services at the mosque.

Several key *approaches* for engaging diverse people in the RISE program were identified within the Culture construct. These included: **setting up program governance to reflect the value placed on the expertise and knowledge of local residents and locally-based staff**; **working toward having equal numbers of men and women on the program team and CECs**; and **adapting settlement-level engagement activities to respond to existing power structures**.

3.4. Characteristics of individuals: Knowledge and beliefs about the intervention

The 'Characteristics of Individuals' domain includes the 'actions and behaviors of individuals' and how these influence the organization and implementation. The 'Knowledge and Beliefs' construct describes 'individuals' attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention [27]. Again, this domain was applied to both the staff and the residents.

Almost all of the Indonesian and Fiji residents' description of the RISE program assessment and PD activities indicated their knowledge of the program and its implementation was accurate. Residents from both countries explained they were regularly informed about the program through multiple channels including letters delivered directly to their homes; verbal communication during a household visit by staff or a local leader; during the regular assessment activities; or during a regular religious service.

The RISE staff descriptions of the program were detailed and consistent with each other's. Where they differed was their perspectives on how the engagement of residents in the PD should be operationalised and the value of some activities. Whilst the process in Indonesia was described by some participants as lengthy and detailed, in Fiji it was described as being more streamlined:

> the approach that is being driven for Suva—from Melbourne–[is] being driven in a very linear (that we'll do step one, and then step two, and then step three) process. We will have an outcome, it will be fine, but I think it will be less rich.
>
> (female staff, Australia/USA)

Another staff member, who supported the more linear process said:

> I sometimes wonder whether that knowledge [gathered in Indonesia] was necessary for my design. As long as the process of co-design was open to what the community wanted to do, we perhaps didn't need to understand the backstory behind it.
>
> (male staff, Australia/USA)

One of the Fiji-based staff explained that the differing approaches were partly related to the size of the settlements (both in terms of population as well as the sizes of public spaces to gather for activities): this staff member felt that whilst a more detailed and lengthy approach might have worked in the smaller settlements of Indonesia, a more structured, linear

engagement approach was needed for the 60–70 household representatives that participated in each Fiji settlement.

This construct revealed a key aspect to the *approach* to engaging diverse residents: specifically that **the length and level of detail of the PD and engagement process needs to be adapted to the context where it is implemented, and time and resources should be allocated to supporting program staff to design the engagement process accordingly**. The key *activities* for engaging diverse residents in the RISE program identified within the Knowledge and Beliefs about the Intervention construct were the **various methods for maintaining regular contact with residents (in relation to both the assessment and PD activities)**.

3.5. Process: Engaging

> *The 'Process' domain includes 'four essential activities of implementation: [. . .] planning, engaging, executing, and reflecting and evaluating' [13, p10]. The 'Engaging' construct describes 'attracting and involving appropriate individuals in the implementation and use of the intervention through a combined strategy of social marketing, education, role modeling, training, and other similar activities' [27].*

The most mentioned activity for successfully engaging residents by residents of both countries was the household visits:

> the committee members usually visit all households, so [. . .] no one is left out.
>
> (female resident, Fiji)

One women's FGD participant explained that normally only the community leaders were consulted in projects but that in RISE every household was included. A men's FGD participant appreciated that 'RISE doesn't look at our faiths: they [just] invite us'.

Most of the residents from Fiji and Indonesia described the PD workshops as being important activities that engaged them in the RISE program. Some residents from both countries added that the gifts they received for participating in the RISE research activities (e.g. phone credit and snacks) were an incentive for participation. Several participants mentioned that the frequency and varied forms of contact they had with program staff not only informed them about the program (see previous section) but also encouraged them to participate. In Fiji, contact was made through letters, pamphlets, phone calls and house calls and in Indonesia, contact was mostly through house calls or phone calls. Some of the residents from both Fiji and Indonesia felt that the friendliness of the staff encouraged them to participate. One woman explained that she was initially intimidated because the team were speaking in English and Bahasa Indonesia but that eventually she felt comfortable:

> They always smile even when we couldn't communicate. When we faced each other, they smiled, we smiled at them as well since we did not know their language.
>
> (female resident, Indonesia)

Another woman had faith in the RISE staff because of their diligence and fairness:

> They worked carefully and hard despite the hot weather, the way they checked the children's weight. They treat all children equally.

(female resident, Indonesia)

Some of the Indonesian residents mentioned other engagement activities that were important to them, including being able to visit the demonstration site; the group aerobics (*senam bersama*); the children's activities; and the free health checks for children as part of the assessment activities. Other key approaches to engagement mentioned by some of the Indonesian residents were: that participation was voluntary; that staff would transport residents with mobility issues to group activities; and their inclusion of elderly people:

> [the staff are] friendly, nice, and the way they talk is understandable, even to the elderly. They spoke simply to us.
>
> (female resident, Indonesia)

The Fiji residents also mentioned additional important approaches to engagement. For example, in two settlements in Fiji, the FGD participants mentioned how they appreciated having separate groups for women, men and youth during the design activities:

> We had a youth time, they had to come up with their ideas concerning the questions from RISE. It was the first time for something like this to happen in the community.
>
> (female resident, Fiji)

They also appreciated how RISE adapted the timing of activities to suit residents and one participant mentioned the value of having local people translate during the PD activities.

All of the staff groups mentioned the importance of establishing trust with the residents to be able to engage them in the RISE program properly and respectfully and that one of the main mechanisms for doing this was through the 'regular activities and rapport that our individual community fieldworkers have with the households' (staff, Australia/USA).

Several staff (from all offices) described how the timing of RISE activities were adapted to suit the residents. For example, one of the Fiji staff explained how the workshops were timed around the festival of Diwali to be able to include Hindu residents in the settlement. As a result, the whole settlement celebrated the festival for the first time. The Indonesian staff explained that workshops were scheduled in the evenings so that those who worked outside the settlement during the day could participate.

Representatives of each of the staff groups explained how the RISE activities were designed to engage resident groups of different sizes (and in various locations) so diverse people were included. For example, there were large community workshops in each settlement; meetings with clusters of households; as well as individual household visits. Several of the Indonesia- and Fiji-based staff observed that household visits meant that within that private space, participation could occur for those who found it harder to participate publicly because they were older, did not speak the dominant language, were of a different ethnicity, had work during meeting times, or were shy. The Australia- and USA-based staff thought that the needs of vulnerable household members were identified more readily during household visits than in the larger group settings.

Arranging some of the RISE activities according to gender (and/or age) was an important engagement strategy described by all of the staff groups. For example, according to the Indonesian staff, whilst the large group workshops seemed to engage women in Indonesia quite well, holding informal conversations with smaller groups of men to the side of the workshops was necessary to engage them. The Fiji staff described how there were separate groups for men and women to ensure that everyone was able to share their views.

The key *approaches* identified included: **regular contact through multiple channels between program staff and residents**; **building good rapport and friendliness between staff and residents**; **providing incentives for participation in group activities**; **adapting the timing of activities to suit residents**; **running some activities in separate (e.g. women's, men's and youth) groups**; **running activities of different sizes e.g. whole community, group of 3–4 households, single household**; **providing transport to activities for those with mobility challenges**; **adapting communication styles to be more inclusive of elderly people**; **having local residents translate during activities**; and **voluntary participation**. The key *activities* for engaging diverse people identified in the Engaging construct included: the **household visits**; **PD workshops**; **visits to the demonstration sites**; **group aerobics**; **special activities for children**; and the **free health checks for children as part of the assessment activities**.

4. Discussion

Our study identifies and documents specific mechanisms for the inclusion of diverse people in a program that aims to improve health through the PD of WASH infrastructure in urban informal settlements. This study uniquely brings together four areas of knowledge: WASH, gender and social inclusion (GESI), PD, and implementation science. The mechanisms (categorised as *activities* and *approaches*) for engaging diverse people in RISE identified under each of the five CFIR domains in this study are summarised in Table 2 above.

Each of the mechanisms for engaging diverse people in the RISE program identified in this study could be applied, selectively, to similar programs where PD is used to improve health and wellbeing in informal urban settlements. However, four mechanisms emerged repeatedly from the data within different domains and are therefore discussed in more detail below.

4.1. Key activity: Household visits

Household visits were the most mentioned *activity* for engaging diverse people in the RISE program and were identified in three of the CFIR domains: Intervention Characteristics, Characteristics of Individuals, and Process. Household visits were conducted by RISE staff for multiple reasons: inviting residents to RISE events, gaining their consent to participate in the program, collecting data for the infrastructure design (e.g., condition of toilet) and collecting data for the assessment component of RISE. If residents were unable to attend community events or it was more appropriate to meet in smaller groups, then household visits were conducted to inform residents about RISE, capture their views and feedback on the program and to capture their input into the participatory design (e.g., preferences for where a pressure tank should be placed).

Household visits built residents' trust in the program and allowed the RISE team to collect information that strengthened the infrastructure design. Specifically, they were a way to capture the perspectives of those who could not participate in larger group, or public, activities due to work and child-care schedules, mobility or communication issues, self-confidence in public settings, cultural norms (e.g., around gender, age and disability), or marginalisation. For this reason, the household visits were an important mechanism for capturing the perspectives of women, people with a disability, older people, shift workers, and other marginalised groups. A process evaluation of a WASH intervention in India similarly found household visits were especially important for engaging newly married and younger women [28]. Pickering et al. [39] also stress the importance of household visits in WASH programming; they found that interventions in Bangladesh, Kenya and Zimbabwe that included regular household visits were more successful in achieving their goals.

It is important to note that household visits may still have limitations in how effectively they are able to engage and include all community members. Avendano et al. [29] and UNICEF [30] warn that collecting data (for assessment or design) in the context of health or WASH interventions at the household- rather than the individual-level risks missing information about intra-household discrimination or disadvantage due to gender, disability etc.. It is encouraging that the RISE program collected demographic data at the individual-level in the assessment activities and used this to tailor some of the infrastructure design (e.g. building toilets in households where there were elderly people with mobility issues and no toilet on the ground floor). However, the household level engagement for participatory design may not have overcome the potential intra-household discrimination that Avendano et al. [29] and UNICEF [30] warn about. This could be addressed by partnering with women's organisations or disabled-people's-organisations (DPOs) who work directly with individuals who are marginalised to capture their perspectives, an approach which has been successful in WASH programs in other contexts such as Western Province, Papua New Guinea [31].

4.2. Key approach: Flexibility and adaptability

In all CFIR domains, apart from Relative Advantage, various *approaches* relating to the flexibility and adaptability of the RISE program were identified as important mechanisms for engaging diverse residents. One such approach was being adaptive to existing power and governance structures within communities (for example, establishing five CECs where there were five clans in a Fiji settlement). Others have also documented the importance of adapting program activities to local structures. For example, Tsekleves et al. [32] and Nelson et al. [33] found in their reviews of literature documenting community engagement in WASH interventions that one of the key factors for engagement was understanding and adapting to local cultural preferences and structures (such as religions).

Other examples of an adaptive approach in the RISE program included the flexible timing of activities to suit residents and having activities with different group sizes (e.g. community workshop, several households or a single household) and different participants (e.g. women's, men's, youth groups) so that residents could participate in a way that suited them. The RISE community engagement strategy [1] indicates that each of these mechanisms were deliberately implemented to engage diverse residents, particularly the activities designed to include children. Again, other research (for example, see O'Donovan et al [34]) has shown that having multiple engagement activities is important for participatory interventions that aim to improve access to WASH.

One of the key selection criteria for a settlement's inclusion in RISE was that WASH was a priority for the community (as well as support from the local government, and the settlement meeting certain demographic and geographical requirements) [14]. The data showed that whilst WASH was one of the priorities of the residents interviewed, there were several other priorities also. The challenge of multiple, and even competing, priorities in communities where WASH programs take place is not unique to RISE, but the flexibility of the RISE program to prioritise residents' needs outside of its original mandate, for example through food rations during the COVID-19 pandemic, built residents' trust in RISE and therefore their engagement with the program. This flexibility was particularly important during the pandemic when it was not possible for RISE to deliver its original outputs, to demonstrate its ongoing support of the residents.

This kind of flexibility showed up in the design of the infrastructure also where, through the participatory design process described in the Results (Outer Setting: Resident Needs and Resources), the team first listened to residents to understand their environmental stressors

and then, together with residents and other experts, identified how the intervention and associated infrastructure could address WASH plus other needs. For example, whilst building raised paths was part of the original mandate of RISE (to mitigate flood impacts on residents), the program was flexible enough to identify ways to build extra accessways (that were not necessary for flood impact mitigation). In this way, the participatory design process, together with a flexible approach meant that residents' needs were merged with program aims in a positive way that increased residents' trust in, and buy-in to, the program. Other research has shown that having the flexibility to respond to participant priorities as part of global health interventions is effective for engagement and the uptake of the services and facilities being offered [35]. This speaks to the importance of flexibility on the part of the funder to allow for the identification of outcomes that matter most to program participants.

4.3. Key approach: Diverse team

Having a diverse program team was an important *approach* to engaging diverse people in RISE; identified in a few ways within the Inner Setting domain. Firstly, the findings suggested that having both men and women on the teams that engaged with residents meant that both men and women from the settlements felt comfortable engaging with RISE. Kumar, Grant & Willetts' [36] guidance on how to improve inclusion and diversity within WASH workplaces and teams focuses on gender equity. However, they also emphasise the importance of having other forms of representation in WASH workplaces such as people with disabilities, sexual minorities, class etc. to be able to engage diverse participants in WASH projects.

Having a diverse program team with respect to nationality, religion and languages spoken was also important for engaging diverse residents, and for this reason having Indonesia and Fiji based teams was critical in RISE. It was necessary for RISE to adapt to the cultural norms and power structures in the settlements (discussed above) whilst at the same time include diverse residents in the program; these two tasks were, at times, in opposition. Finding the balance between cooperating with existing power structures and not entrenching existing inequalities within those structures further is a common challenge in WASH programs [28, 37, 38]. Working toward this balance would not have been possible without staff who were based in and familiar with the Indonesia and Fiji contexts.

4.4. Key approach: Regular contact and positive rapport between staff and residents

Regular contact between the staff and residents was identified as an important *approach* for engaging diverse residents within the CFIR Process domain and specific methods for doing this were identified as important *activities* within the Characteristics of Individuals domain. The importance of positive rapport and friendliness between staff and residents was also identified as an important *approach* within the Process domain. This regular and positive rapport (that may not have easily been established in a program that only conducted community workshops, for example) seemed to build residents' trust in RISE and therefore encouraged their involvement with and investment in the program, even during the COVID-19 pandemic when in-person program activities paused. Given that this contact was often at the household level, it meant that diverse residents, not just the community leaders or representatives, felt that they had trust in the RISE program because of their close contact. The importance of genuine, frequent and long-term contact between WASH program implementers and residents has also been noted in other studies. For example, Tsekleves et al. [32] found that engagement in WASH programs in sub-Saharan Africa should be long-term and done with intentionality. Furthermore, in their review of WASH interventions Pickering et al. [39] found that there

were better outcomes (such as reduced diarrhoea) when implementers had at least fortnightly contact with participants.

4.5. Implications for research and practice

It is already understood among the WASH sector that first, participatory and inclusive design practices lead to more successful WASH interventions [33] and, second, that participatory approaches to WASH infrastructure design projects have the potential to be more inclusive of diverse people such as children [40] and people with disabilities [41, 42]. With participatory design approaches increasingly being promoted as part of WASH interventions, it is therefore important to understand the key mechanisms of these approaches through rigorous analysis. This study identified several mechanisms—both activities and approaches—for engaging diverse people in programs that aim to improve health and wellbeing outcomes in informal settlements through the PD of water and sanitation infrastructure (see Table 2 above). This contributes to a call for documented knowledge that practitioners can draw upon to better engage diverse people in similar interventions. We recommend that practitioners wishing to adopt any of the key mechanisms identified in this study begin with the *approaches*. These approaches can be thought of as transferable principles for program design and are a useful starting point for staff to reflect on how their program will engage diverse people before *activities* begin. The activities should be adapted to different project contexts (as they were in the RISE program, e.g., aerobics was only done in Indonesia).

Some of the mechanisms identified in this study such as household visits, regular contact between staff and residents, the flexibility to incorporate resident needs as co-benefits and partnering with organisations such as women's groups and DPOs are resource-intensive, which is a potential barrier to adopting these approaches and activities in projects operating with a small budget or at a large scale. Nevertheless, this study, together with others, have demonstrated the importance of these mechanisms for building residents' trust and buy-in, which are essential for engagement and the sustainability of positive program outcomes, particularly when programs are interrupted. Hence, these mechanisms should be considered, particularly for settlement-level projects, at the very beginning of program planning when budgeting and resource allocation take place. Accordingly, donors and funding agencies should not only allow for sufficient allocation to these types of activities but also require grantees to demonstrate how their programming will ensure gender and social inclusion among its staff and participants.

This study identified key mechanisms for engaging diverse and marginalised residents in one program that has adopted the PD of WASH infrastructure in urban informal settlements. To assist those who wish to conduct similar programs, other outputs of this study include a toolkit for WASH practitioners [43] and policy brief for governments and donors [44] on gender and socially inclusive PD for WASH, drawing on RISE practices. To strengthen and expand on these findings, studies of other, similar, programs are needed; particularly at the point where infrastructure has been commissioned to residents as well as at the point where it is expected that residents experience the positive health and wellbeing outcomes of that infrastructure.

4.6. Strengths

A key strength of this study is its contribution to the literature related to implementation science in WASH (something others, including Haque & Freeman [16] have called for), particularly by documenting the adaptation and application of the CFIR outside of a clinical, high-resource setting for which it was originally designed. A systematic review [45] summarised the

more recent use of the CFIR to analyse interventions in low-income countries, yet these studies were all in clinical settings. There are some examples of the CFIR being used for interventions outside of clinical settings, such as in schools, but these are few [46]. Whilst Haque & Freeman [16] recommend the use of the CFIR for community-based WASH interventions, to our knowledge this is the only study to apply the framework to data from a community-based WASH intervention to date. The CFIR was intended to be adapted for different settings and our study provides an example of how the CFIR can be adapted and applied in WASH programs, including through the broadening of the definitions of 'implementer' and 'recipient' of an intervention.

The qualitative methods adopted in this study meant that the RISE program could be examined from an emic perspective, leading to rich and nuanced findings. The collection of data from participants with a range of genders, languages spoken, roles or involvement in the RISE program, marginalisation and location–both across settlements and two diverse countries in Asia and the Pacific–allowed for the comparison and corroboration of the findings. In particular, the study deliberately recruited individuals who were marginalised (a challenge in many studies due to stigma, lack of trained researchers, or resources) to ensure that their perspectives were represented.

4.7. Limitations

The main limitations of this study relate to interviewer bias, especially for our Indonesian data. All data from Fiji were collected and analysed by staff who were recruited specifically for this study and were not involved in other RISE assessment or implementation activities. However, in Indonesia, data from residents were collected by RISE program staff because COVID-19 travel restrictions interrupted the recruitment of independent enumerators. This, and the involvement of some RISE staff as co-authors to provide further context and clarification post-analysis, may have introduced bias.

A major focus of this study is gender equality; however, we were not able to account for participants who may have identified as gender non-binary nor trans-gender. Whilst this was part of the original study design, when the pandemic restricted travel and face-to-face interaction between the research team and participants, this aspect of the study was omitted.

Although every attempt was made to recruit resident participants from a range of marginalised groups, this was limited due to lockdowns and restrictions on travel caused by the COVID-19 pandemic and it is unlikely that this study captured the perspectives of the most marginalised residents in the settlements. Whilst it is best practice to use multiple disability measures to identify people with disabilities [47], it was only possible to use a single measure (WG questions in Indonesia) or self-identification (Fiji) in this study. Ideally, the project team would have formed deeper partnerships with local groups and worked with them to recruit marginalised residents and this is recommended for future, similar, studies.

Finally, there may also have been some bias introduced through not having recruited young women in Fiji for the in-depth interviews (the youngest woman recruited was 45 years old).

5. Conclusion

This study sought to identify, through the application of the CFIR, the key mechanisms for engaging diverse people in the RISE program in Makassar, Indonesia and Suva, Fiji. Several activities and approaches for engaging diverse residents in the RISE program were identified, of which four key mechanisms are recommended for future scale-ups of RISE and similar programs: engagement with residents at the household level (and potentially the individual level);

flexibility and adaptability; having a diverse team; and maintaining regular contact and positive rapport between the staff and participants.

The CFIR provided a useful structure for examining key mechanisms for engaging diverse residents in the RISE program, particularly in that it facilitated program implementers to reflect on their own practice and identities. It is recommended that CFIR be adopted for future studies of WASH programs that include participatory approaches.

This study responds to the need for implementation science research that focuses on WASH interventions, particularly those that adopt PD approaches for improving access to WASH in informal urban settings. Through identifying key mechanisms for engaging diverse people in such WASH interventions, future implementers are better placed to meaningfully engage all residents, including those who are typically marginalised.

Supporting information

S1 Checklist. Inclusivity in global research checklist.
(PDF)

S1 Text. Supporting information 1: Short descriptions of CFIR domains and constructs (pre-2022 version).
(DOCX)

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Details of the RISE study and how to access supplementary data and other material, can be found on the study website (www.rise-program.org).

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