IIHMR UNIVERSITY | SD GUPTA SCHOOL of PUBLIC HEALTH

Barriers and Facilitators of Community Engagement in Dengue Interventions in Conflict- affected Aden, Yemen: An Implementation Research

PRACTICUM REPORT

By

Mustafa Mohammed Abdullah DhaibanCohort-01

2022 - 24

Under the Guidance of

Neetu Purohit

Professor

IIHMR University

Organization Supervisor's

Huda Basaleem

Professor

University of Aden

CERTIFICATE BY SCHOLAR

This is to certify that the Practicum Project title submitted by me, **Mustafa Mohammed Dhaiban** with Enrolment No. (0009) under the supervision of ***Neetu Purohit, Professor, IIHMR University, Jaipur and Organizational Practicum Supervisor Huda Basaleem, Professor, University of Aden, Yemen*** for award of **Master of Public Health (Implementation Science)** carried out during the period ***2022-2024*** embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other -University or other similar institution of higher learning.

Mustafa Dhaiban

MPH (IS) Cohort 2022-24

Republic of Yemen

University of Aden

Faculty of Medicine and Health Sciences

الجمهورية اليمنية

جامعة عدن

كلية الطب والعلوم الصحية

9 September 2024

TO WHOMSOEVER MAY CONCERN

This is to certify that ***Mustafa Mohammed Dhaiban*** student of Master of Public Health (Implementation Science) Program offered by IIHMR University, Jaipur has undergone Practicum Training from ***October 2023 to September 2024.***

The Candidate has successfully carried out the study designated to his practicum training and his approach to the study has been sincere, scientific and analytical.

The Practicum Training is in fulfillment of the course requirements.

I wish him success in all his future endeavors.

Huda Basaleem, Professor of Community Medicine & Public Health, Faculty of Medicine & Health Sciences, University of Aden

Practicum Advisor

Barriers and Facilitators of Community Engagement in Dengue Interventions in Conflict- affected Aden, Yemen: An Implementation Research

Abstract

Dengue fever is a global concern, described by the World Health Organization (WHO) as “the most important mosquito-borne viral disease in the world”. In Yemen, dengue fever has greatly impacted the population, with over 100,000 cases and 220 deaths reported in the last four years. Moreover, the political conflict consequences increased dengue fever, particularly in Aden Governorate, where dengue is one of the most prevalent and deadly diseases. From 2020 to August 7, 2024, Aden reported 12,200 cases (12% of total cases) and more than 100 deaths (45% of total deaths).

This study aims to identify the barriers and facilitators for community engagement in dengue interventions within conflict-affected context and recommend evidence-based strategies for better implementation, with special focus on utilizing the Consolidation Framework for Implementation Research (CFIR) 2.0 framework.

Methodology: A cross-sectional study using qualitative approach, was conducted from February 2024 and July 2024 in Aden Governorate. The study included 15 In-depth-Interviews (IDIs) and 4 Focus group discussion (FGD) with key stakeholders, utilizing CFIR 2.0 tool for data collection. Content deductive analysis, by NVivo14 software coded using CFIR 2.0 codebook which provided comprehensive structure that guided the identification and analysis of key themes and sub-themes relevant to the research objectives.

Result: The study result divided into five major themes, the Innovation theme present the positive experience and perception of key stakeholders regarding community engagement interventions, as well as the complexity arising from lack of community trust in the overall health system. The Outer and Inner setting themes shows the impact of conflict, such as security issues, lack of trust, training, shortages of human and material resources, and the politicization of the health system. The Individual theme clarifies participants perception of key stakeholders’ roles, needs, capabilities, and their motivations. Lastly, the Implementation process theme identifies the key barriers, facilitators, and adaptation strategy for community engagement interventions.

Conclusion: The health system in Yemen faces significant challenges due to conflict and political unrest. The use of CFIR 2.0 domains and constructs provided a detailed analysis of the barriers and facilitators of community engagement interventions in the local context. Moreover, interpreting these findings with similar settings offers a holistic understanding of the conflict environment and it is impact on the health system.

We recommend the early initiation of community engagement and Social Behavioural Change (SBC) interventions, with focus on policy empowerment, government-donor agreement, and the necessity of political commitment.

Keywords: Health and conflict, Community engagement, Dengue control, Political unrest.

Acknowledgements

I would like to express my sincere gratitude and appreciation to all those who have supported me during my practicum journey.

First, I am deeply thankful to my external advisor Dr. Huda Basaleem for her guidance and the tremendous effort she made to enrich my academic knowledge and skills, she was always available and welcoming my doubts and questions whenever I ask her, her support was not only in academic field but, she also used her networks and influence to make my practicum easer as much as she can. She is the great dedicated example for the work of academic field in public health in Yemen.

Secondly, I also would like to express my deep respect and appreciation to my internal advisor Dr. Neetu Purohit for her guidance in IIHMR University and her continued support after my return to Yemen. She fulfilled me with her wisdom and provided the first insight into this practicum topic during her teaching the social behavior change module. From her, I learned the importance of collaboration, active listening.

I am also grateful to S.D Gupta School of Public Health office for the resources and support provided to me, and to the TDR program as well.

I acknowledge Dr. Awsan Bahattab for her assistance with the CFIR framework interview guide. Her experience in the humanitarian field were very useful in selecting the needed construct from the CFIR domains.

I extend my thanks and appreciation to the Malaria Program team in WHO Yemen Office, including Dr Samira Al-Eryani (Technical office entomology and vector control), Dr. Adel Al-Jasari (Malaria and Vector Control Officer-Yemen), and Abdullah Ameen Awash (Technical Officer-Vector Borne Diseases Control-Aden) for their initial support, discussions, and guidance on my practicum topic.

Additionally, I would like to thank my colleagues, particularly Dr. Abdirahman Moallim and Rimaz Dawelbait for our online discussion that helped shape our understanding for the implementation research.

Lastly, l am very grateful for my family for their patience with me of not doing anything other than this practicum. My deepest thanks to everyone have been part of this journey.

Mustafa Dhiaban

Table of Contents

Abstract ..... **iv**
Acknowledgements ..... **v**
List of Figures and Tables **9**
Abbreviations **9**
Chapter 1: Introduction **10**
1.1 Background 10
1.2 Rationale 10
1.3 Research question 11
1.4 General objective 11
1.5 Specific objectives 11
Chapter 2: Review of Literature **12**
2.1 Health System and Public Health Issues 12
2.2 Bridging the Dengue Prevention Gap 12
2.3 Behaviour Change and Sustainability 12
2.4 Implementation research with use of CFIR framework 13
2.4.1 Input - CFIR Framework Analysis 13
2.4.2 Process - Stakeholder Perception and Barriers/Facilitators Analysis 14
2.4.3 Output and Outcome - Evidence-Based Information and Recommendations 14
Chapter 3: Methodology **16**
3.1 Study design 16
3.2 Study setting 16
3.3 Study Population 17
3.3.1 Inclusion criteria 17
3.3.2 Exclusion criteria 17
3.4 Sampling 17
3.4.1 Sample size 17
3.5 Pre-test 17
3.6 Data collection 18
3.7 Data analysis 18
3.8 Ethical Considerations 18
Chapter 4: Results **19**
4.1 Innovation domain: 21
4.1.1 Evidence-Base 21
4.1.2 Relative Advantage 21

4.1.3 Innovation Complexity 22
4.1.4 Innovation Design 22
4.1.5 Innovation Cost 23
4.1 Outer setting domain: 23
4.2.1 Critical Incidents 23
4.2.2 Local Attitudes 25
4.2.3 Local Conditions 26
4.2.4 Partnerships & Connections 27
4.2.5 Policies & Laws 28
4.2.6 Financing 28
4.2.7 External pressures 29
4.3 Inner setting domain 30
4.3.1 Work Infrastructure 30
4.3.2 Relational Connections 30
4.3.3 Communications 30
4.3.4 Culture 31
4.3.5 Tension for change 31
4.3.6 Relative Priority 31
4.3.7 Incentive Systems 32
4.3.8 Available Resources 33
4.3.9 Access to Knowledge & Information 34
4.4 Individual domain 34
4.4.1 Policymakers 34
4.4.2 Implementation Team Members 36
4.4.3 Opinion Leaders 37
4.5 Implementation process domain 38
4.5.1 Teaming 38
4.5.2 Assessing Needs 38
4.5.3 Assessing Context 39
4.5.4 Planning 41
4.5.5 Tailoring Strategies 42
4.5.6 Reflecting & Evaluating 42
4.5.7 Adapting 43
Chapter 5: Discussion 56
5.1 Innovation domain 56
5.2 Outer setting domain 56

5.3 Inner setting domain 57
5.4 Individual domain 58
5.5 Implementation process domain 58
Chapter 6: Conclusions 61
6.1 Recommendation: 62
6.2 Research strengths & limitations 63
6.3 Future research directions 63
References 64
Annexures 71
ANNEX 1 -In-Depth Interviews Guide 71
ANNEX 2 -Focus Group Discussion Interview Guide 74
ANNEX 3 - CONSENT FORM 76

List of Figures and Tables

List of Figures and Tables	Page number
Figure 1: Conceptual Framework for CFIR & Community Engagement interventions….....	15
Figure 2: Aden governorate map ……..	16
Figure 3: Numbers of Themes, Sub-themes, Barriers & Facilitators	19
Figure 4: Theory of Change: Implementation Research for School-Based Dengue Intervention in Aden Governorate……...	59
Chapter 4: Participants profile…….	16
Chapter 4: Summary of Barriers and Facilitators for Community Engagement Interventions in Dengue Control in Aden Governorate….	**46**
Chapter 4: Stakeholders Mapping & analysis…….	**54**

Abbreviations

List of Abbreviations / Acronyms	
CFIR	Consolidation Framework Implementation Research
EIDEWS	Electronic integrated disease early warning *system*
ExU	Executive Unit for IDP Camps Management
FGD	Focus Group Discussion
IDI	In Depth Interview
IDPs	internally displaced persons
IEC	Information, Education and Communication
IRS	Indoor residual spraying
LLINs	Lasting insecticide-treated bed nets
MoPHP	Ministry of Public Health and Population
NCI	The National Cancer Institute
NMCP	The National Malaria Control Program
SBC	Social Behavioural Change
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

Chapter 1: Introduction

1.1 Background

Dengue Fever is a global health concern affecting over 100 countries, causing approximately 100 million cases and 25,000 deaths annually(1), the WHO describes dengue as "the most important *mosquito-borne viral* disease in the world"(2). This viral disease, transmitted by *Aedes aegypti and Aedes albopictus mosquitoes*, presents symptoms ranging from fever to severe complications, with 80% of cases being asymptomatic (1) . In Yemen, the population has been severely affected by dengue fever, with 104,940 cases and 221 deaths reported from 2020 to 7 August 2024 in the southern part of the country (3). Yemen suffers greatly from dengue, especially because of the ongoing political conflict and instability that have weakened its healthcare system and exacerbated the multifaceted nature of dengue disease (4–8). The lack of the necessary health needs makes it difficult to provide adequate health services and prevent dengue outbreaks (9,10). In Aden governorate, dengue fever has become the most common and deadly disease, with 12,203 cases and 100 deaths reported from 2020 till 7 August 2024 by the Ministry of Public Health and Population (MoPHP) (3).

1.2 Rationale

According to the available evidence, the majority of the dengue cases in Yemen are in the 15-34 age group, accounting for approximately 50% of the total cases (3). Dengue incidence peaks around the ages of 10–14 among both sexes (11), and the disease peaks during certain seasons, posing a major challenge to the public health and social well-being (8). A recently published paper highlighted the connection between the presence of Internally Displaced Persons (IDPs) and increased dengue incidence; the first case of dengue in Chad was reported in 2023 after displacement of Sudanese people (8).

A systematic review by Mahmud and others (12) emphasize the effectiveness of combining environmental management and community participation in dengue control. Moreover, intersectoral coordination and support from various agencies have shown success in sustaining environmental management (6,13) . The WHO with One Health concept underscore the importance of a collaborative, multisectoral approach (14,15). Nevertheless, while the effective strategies' of disease prevention and control are many, their impact on health outcome is often under-evaluated after scaling up. (16).

In this implementation research, the CFIR framework was utilized to identify barriers and facilitators associated with the current design of community engagement

interventions for dengue control, which primarily relies on direct communication with community through door-to-door education by health workers and community volunteers. However, door-to-door education strategy are currently used for health education in different health issues such as, polio vaccine, malnutrition, and malaria. An unpublished report for the Mentor Initiative an intervention implemented across five districts in Aden Governorate (Al-Mansoura, Dar Saad, Al-Shekh Othman, Al- Buriqaha and Al-Mulla) between January 2021 and December 2021. The project included various activities, including door-to-door education and entomological surveys and Information Education and Communication (IEC) mass media campaigns. The main challenges reported included delays in coordination due to COVID-19, the majority of government employees taking their annual leaves during Ramdan, high temperature and humidity making it difficult to finding *mosquito pupae*, difficulties in training health volunteers, pressure from beneficiary for material support, challenges in obtaining epidemiological data from responsible authorities and delay of getting permeation for the IEC approvals (29). Moreover, the lack of evidence-based information analyzing the barriers and facilitators to community engagement interventions in conflict context (17,18) motivated us to address the following implementation research question:

1.3 Research question

What factors facilitate or hinder the implementation of community engagement programs for dengue prevention and control in Aden Governorate?

1.4 General objective

- To determine the barriers and facilitators for community engagement in dengue interventions and recommend evidence-based strategy for better implementation.

1.5 Specific objectives

1. To explore the perceptions of key stakeholders, including policymaker, program manager, intervention implementor, and community leaders to gain insights into their involvement in implementing dengue control and prevention strategies.
2. To analyze the factors influencing both the hindrances and the success of community engagement interventions in dengue prevention and control within Aden Governorate.
3. To provide evidence-based recommendations for improving the implementation of community engagement interventions for dengue prevention and control in Aden Governorate.

Chapter 2: Review of Literature

2.1 Health System and Public Health Issues

Yemen faces a humanitarian crisis compounded by natural disasters. Approximately 55% of health facilities are currently working (19). The main reason for non-functionality: lack of staff: 79%, lack of equipment: 53%, lack of finances: 45%, lack of medical supplies: 43% (20) . The number of health worker for 10.000 people are only 10 ,which is less than half of the basic health coverage (21), more of 18 million are in need of humanitarian aid 4.5 million are (IDPs) rising the challenges in the country (22). The rainy season and floods heighten the risk of major cholera outbreaks and *mosquito-borne* diseases such as malaria, dengue, and chikungunya. With over 84% lacking access to clean water, the risk of communicable diseases is elevated (23). Additionally, the similarity of symptoms between COVID-19, dengue, and chikungunya and other diseases poses a unique challenge (24).

2.2 Bridging the Dengue Prevention Gap

Numerous national research studied knowledge practice and attitude (KAP) shows clear gap between the community knowledge and their commitment to preventive measures(25–27,18,28). Study conducted in AL-Hodeidah governorate, shows 57% from the participants believed that eliminating dengue breeding sites is government responsibility (26).However, research highlighted the importance of community engagement as a key solution to health issues within the current Yemen situation to assure the continuity of the health message (18,21).

2.3 Behaviour Change and Sustainability

In the Yemeni context, where the absence of specific treatment and high economic cost for dengue disease, prevention has become the primary mode of control (29). Currently the focus on the distribution of Long-Lasting Insecticide-treated Bed Nets (LLINs), Indoor Residual Spraying (IRS), and fogging campaigns with door-to-door education. Nevertheless, they mostly depend on donor fund which can stop or interrupted to any reasons (30). On the other hand, community interventions, proven effective, In term of cost and sustainability in dengue prevention worldwide (29,31,32). The key challenge is lack of interest and an attitude of dependency on action from the health sector of local

community (33). Since dengue vectors breed based on human behaviour, engaging local communities as active partners in designing, implementing, and monitoring dengue control programs is crucial(34). Uses positive deviance to enhance vector control behaviours, encouraging community involvement through activities like small competitions This fosters ownership for sustainable interventions (35). The positive deviance approach involves identifying individuals who exhibit outstanding performance in specific measures and understanding the factors contributing to their success. However, it has been applied to manage different health problem, including pregnancy outcomes, newborn care, weight control, and female genital mutilation (36).

2.4 Implementation research with use of CFIR framework

Implementation research is active process that enhance the integration of evidence-based data into routine practice .The National Cancer Institute (NCI) has defined implementation research as "the study of methods to promote the adoption and integration of evidence-based interventions ,including practices and policies, into routine health care and community settings to improve health outcomes" (37).

Many efficient disease control tools or strategies are available, that shown the potential of such tools and strategies to be effective at the community level, impact on health outcomes frequently fall below expectation after scale up and system-wide implementation. In order for a 'proven' intervention to be effective, it must be accessible to the target group, health care providers/service providers must comply with the relevant national or local policies, and patients must adhere to the intervention (16). The CFIR Framework is one of the commonly used tools for investigating the contextual barriers and facilitators of intervention which influence it's outcome (38). The explanation for the use of CFIR framework is described below:

2.4.1 Input - CFIR Framework Analysis

In the initial phase of our community engagement initiative for dengue prevention and control, we applied the CFIR 2.0 framework to comprehensively assess various domains influencing the success of community engagement program. The CFIR framework guided our understanding of the contextual factors that may impact the implementation process and outcomes. The analysis was structured into the following domains: Innovation Domain, Outer Setting, Inner Setting, Individual Domain, and lastly

Implementation Process domain, with selection of 28 construct out of the total 48, and 5 sub-construct out of the total 19 (39,40).

2.4.1.1 Innovation Domain

This domain helps identify the credible, adaptable, and effective the program, and whether its design aligns with the local context and resources.

2.4.1.2 Outer Setting Domain

This domain allows for an analysis of how societal values, economic conditions, external pressures, and partnerships may impact the success of the dengue control program.

2.4.1.3 Inner Setting Domain

This domain helps identify how structure, relationships, communication practices, culture, and internal dynamics may influence the program's implementation.

2.4.1.4 Individuals Domain

This domain helps identify the influence of leaders, facilitators, and team members, as well as the characteristics and motivations of those delivering and receiving the dengue control program.

2.4.1.5 Implementation Process Domain

It allows for an analysis of how well the activities align with the context, address needs, engage stakeholders, and adapt to challenges.

2.4.2 Process - Stakeholder Perception and Barriers/Facilitators Analysis

Building on the CFIR framework, we conduct a thorough analysis of key stakeholder perceptions regarding dengue engagement programs. This included an in-depth exploration of barriers and facilitators within the CFIR domains. The two-way arrows connecting this section to the community engagement program signify the direct influence of stakeholder perceptions on program success and, conversely, the potential impact of the program on changing stakeholder attitudes.

2.4.3 Output and Outcome - Evidence-Based Information and Recommendations

The final section is presents evidence-based information derived from the community engagement program. The two-way arrows emphasize the cyclical relationship between the program and its results, reinforcing the importance of continuous assessment and improvement. Furthermore, based on the evidence gathered, we provided recommendations for developing long-term, evidence-based strategies to enhance community engagement in dengue interventions. These recommendations informed by

the CFIR framework, ensuring a holistic and contextually sensitive approach to adapting community engagement.

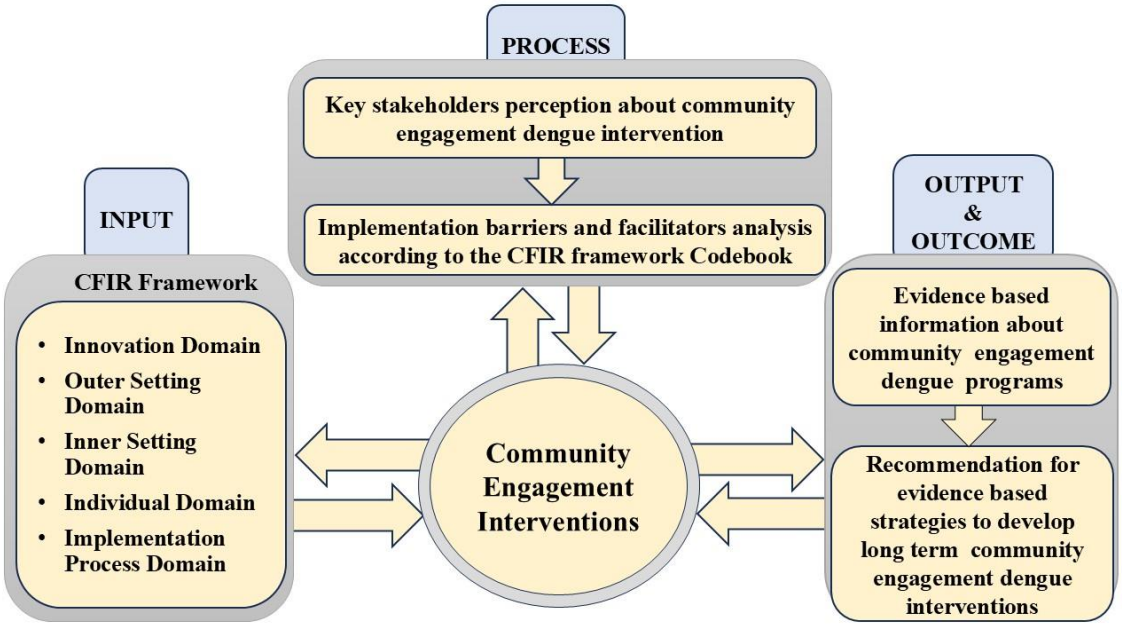


Figure 1: Conceptual Framework for CFIR & Community Engagement interventions.

Chapter 3: Methodology

3.1 Study design

This is cross-sectional study using qualitative approach of inquiry, conducted from February 2024 to July 2024.

3.2 Study setting

Aden is the largest city of southern Yemen and it is also the administrative center of the Aden governorate. Since 2015, Aden has been the temporary internationally recognized capital of Yemen. With population approximately 1.14 million residents (41).Executive Unit for IDP Camps Management (ExU) estimated 145,857 individuals (IDPs) currently living in Aden (42,43). Aden Governorate positioned along the coast of the Gulf of Aden, is situated between latitudes 12.9° N-12.7° N and longitudes 45.1° E-44.4° E, covering a total area of 712.48 km², as illustrated in Fig. 2. This city falls within the tropical region (44). Ddengue fever has become the most common vector-borne disease in Aden, with 12,203 cases and 100 deaths reported from 2020 till 7 August 2024, by MoPHP (3). Due to political instability the humanitarian crisis, and large number of (IDPs) in Aden multiple international and national organization are working in vector-borne diseases under supervision or collaboration with National Malaria Control Program (NMCP) (42).

Figure 2: Aden Governorate Map.

3.3 Study Population

The study targets entities actively involved in community engagement activities related to dengue prevention and control, including policymakers, program managers, implementors and community leaders. The exclusion and inclusion criteria as follow:

3.3.1 Inclusion criteria

- Any community engagement dengue interventions implemented within Aden governorate over the past three years.
- Participation of local, international, governmental, non-governmental organizations, as well as individuals actively involved in community engagement initiatives specifically centered around dengue prevention and control. This includes policymakers, program managers, implementers, community leaders engaged in activities.

3.3.2 Exclusion criteria

- Community engagement dengue interventions with a duration of less than three months.
- Participants who refused to be included.

3.4 Sampling

Purposive sampling with snowball technique used to identify cases of interest by sampling people who know others with similar characteristics(45) . Key stakeholders were asked (usually at the end of an interview) if they know of anyone else in the local, system, or national context who should be asked for an interview (46).

3.4.1 Sample size

The qualitative component included 15 (IDIs) and 4 (FGDs) to reach the saturation point.

3.5 Pre-test

The qualitative pre-test conducted with participants have more than 20 years of experience of working with NMCP and 6 years of experience with international organization. Due to local context issues and limited recourse, it was challenging to conduct pre-test was FGD. This pre-test assesses the efficacy of the CFIR interview guideline tool, language translations, and question suitability. Insights from these pre-tests led to refining the exclusion criteria from community engagement interventions

lasting more than three months to those implemented in Aden Governorate, as only one intervention met all criteria was implemented at 2021.

3.6 Data collection

The qualitative data for (IDI) (Annex 1) and (FGD) (Annex 2) were collaboratively conducted by the principal investigator and assistant possessing a good background in qualitative data methodology. The assistant is experienced in both qualitative research techniques and possesses a comprehensive understanding of the dengue program and community engagement initiatives. The process guided by CFIR 2.0 framework interview guideline tool, initially developed from CFIR.com (39). The interview protocol further refined to integrate specific questions from the CFIR 2.0 framework that directly pertain to the research questions and objectives, ensuring alignment and relevance to the study objectives. The CFIR is intended to be used to collect data from individuals who have power and/or influence over implementation outcomes (38).

3.7 Data analysis

The qualitative guides were developed in English and translated into Arabic for interviews, after obtaining informed consent (Annex 3), interviews have been recorded. The recorded IDIs and FGDs transcribed verbatim into English, and then coded using NVivo 14 software. Content deductive analysis, by CFIR 2.0 codebook which provided comprehensive structure that guided the identification and analysis of key themes and sub-themes relevant to the research objectives (46,47).

3.8 Ethical Considerations

The study obtained ethical approval from University of Aden Research Ethic Committee, informed consent from the participants. The study ensured confidentiality, anonymity, privacy, and safety of the participants and their data, in accordance with the Helsinki declaration (48).

Chapter 4: Results

Our research results are organized into five major themes, each further theme is divided into sub-themes. These themes and sub-themes are systemically analysed and categorized according to the updated CFIR framework 2.0 codebook (38). Table No. (2) and Figure No. (3) provide a summary number of themes, sub-themes, and barriers and facilitators identified within each. Additionally, the table No. (3) present stakeholders mapping and analysis generated from participants' inpi .

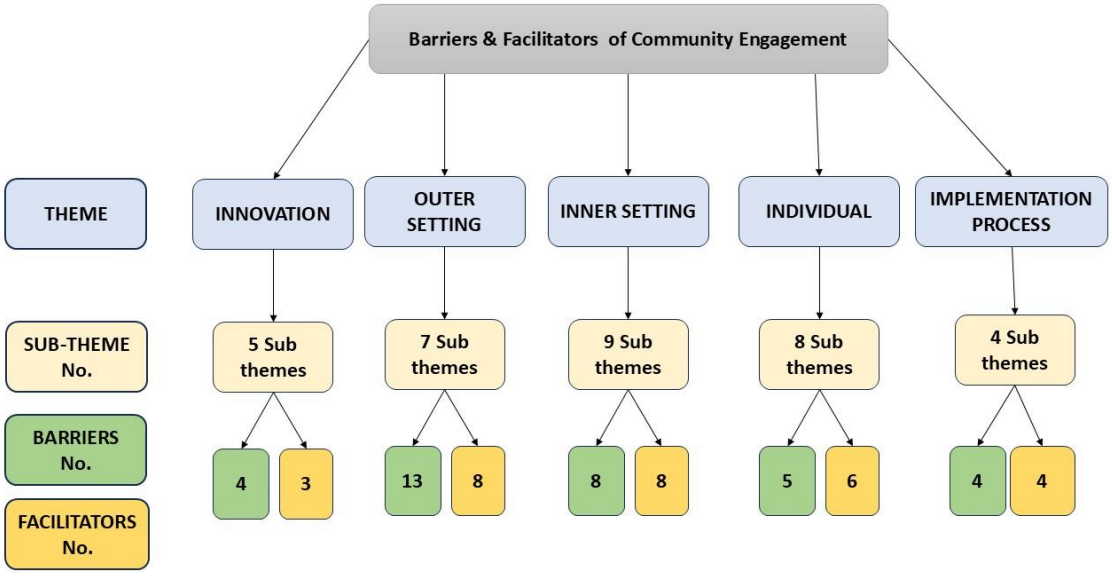


Figure 3: Numbers of Themes, Sub-themes, Barriers and Facilitators.

Participants description:
This qualitative research involved 15 participants for (IDIs) and four (FGDs). The IDI were distributed across four main categories: Ministry of Public Health and population (MoPHP) employee (10 participants), organization consultant category (3 participants), organization employee (2 participants). The FGDs were conducted separately with male and female community committees working in Al-Mansoura and Dar Sa'ad district at Aden Governorate. The participants category and their ID number, roles, and years of experience, are further detailed in table No. (1).

Table No. (1) Participants profile

Participant Category	Participant No. (Sex)	Participant role (years of experience)
Decision Maker	**P 7** (Male)	Public Health and Epidemiology Consultant (35 years)
	P 15 (Male)	Public Health Consultant on SBC (30 years)
	P 5 (Male)	Public Health Consultant on vector-borne disease (5 years)
Organization employees	**P 6** (Male)	International Organization Employee on vector-borne disease (2 years)
	P 12 (Female)	Executive Director of local organization worked at Aden vector-borne disease (14 years)
Community Committee	**FGD 1** (Female)	Male and Female Participants are part of community committee and involved at different roles such as women and chilled officers, secretaries, mediator and resolving family dispute and conflict at Dar Sa'ad district
	FGD 2 (Male)	
	FGD 3 (Female)	Male and Female Participants are part of community committee and involved at different other roles such as leadership and governess, support community initiative, health campaign. at AL-Mansoura district
	FGD 4 (Male)	
Ministry of public Health and population (MoPHP)	**P 4** (Female)	Employee at ministry level on epidemiological surveillance (3 years)
	P 8 (Male)	Employee at ministry level on national program for health education and information. (10 years)
	P 9 (Male)	Employee at ministry level on national program for health education and information (21 years)
	P 10 (Female)	Employee at Aden health office - Governorate level (15 years)
	P 11 (Male)	Employee at Aden health office - Governorate level (11 years)
	P 13 (Male)	Employee at Aden health office – AL-Mansoura district (6 months)
	P 14 (Male)	Employee at Aden health office Al-Mansoura District Dar Sa'ad district (2 years)
	P 1 (Male)	National malaria program employee (17 years)
	P 2 (Male)	National malaria program employee (25 years)
	P 3 (Male)	National malaria program employee (1 year)

4.1 Innovation domain:

4.1.1 Evidence-Base

Participants acknowledge the importance of community engagement interventions, citing their personal experiences, the executive director for local organization participant No 12 said: *"In general, my experience was in Lahj Governorate in the field of dengue fever. During my work in epidemiological surveillance, I had direct involvement with dengue fever, knowing its causes and ways of spreading. One of the innovative solutions was that we entered through elementary schools and asked fifty students from the school to take a sample to investigate places where water accumulates in the house and bring samples of larvae. It was a very beautiful intervention and found a response from the students. Everyone searched for sources in places that we, as public health specialists and epidemiologists, did not expect, such as water from refrigerators and hidden sink places. We got rid of the larvae and noticed a great improvement in the number of dengue fever infections in the district where the activity was implemented. The activity was implemented approximately in 2015-2014."*. However, no scientific evidence has been cited and most of the participants expressed lack of evidence-based knowledge.

"I am not aware of any scientific evidence [of the effectiveness of these interventions], but there have been many efforts and training courses conducted by the Ministry of Health and Population to involve the community for many years. Community involvement is a necessary process to bring any community change, especially in the health sector." Participant No 9 (MoPHP)

4.1.2 Relative Advantage

The research participants think, community engagement interventions as community-driven, and aligned with community needs, also considered as a best strategy for dengue control. Participant working at the national malaria control program for more than 17 years said: *"Awareness raising and community involvement in dengue control are crucial because we cannot fully control the vector or guarantee complete treatment. However, we can limit the problem by ensuring community participation".*

Nevertheless, community committee members and MoPHP employees expressed doubt about the effectiveness and the purpose of current community engagement activities. *"There is no community involvement. People are suffering, and despite the presence of*

dengue and cholera, there is no guidance. Only sometimes pesticides are sprayed." Female Participant No 6 from FGD conducted at AL-Mansoura district. In addition to that participant No 9 (MoPHP) stated:

"The interventions of the Ministry of Health and Population, whether in the preventive or curative aspect, are continuous and effective. But I believe that the community aspect has no significant role, although it is the main pillar. In other words, it is not involved in the planning or implementation process, and even in the supervision process, it is just a formality, nothing more or less "

4.1.3 Innovation Complexity

Participants generally did not perceive complexity in community engagement interventions (the innovation).They identified external complexity factors including : lack of financial budgets, negative impact of social media and spread of wrong information, and lack of trust which is interestingly, connected from the community committees participants with the presence of different health problems such as health serves availability, patient doctor relationship, hygiene of health centres and price /quality of difference of drugs. As members of male community committee at Al-Mansoura said:

“Participant 6: The community has lost trust due to the perceived relationship between doctors, pharmaceutical companies, and financial benefits, leading to a lack of confidence in medical advice.

Participant 4: The lack of hygiene in healthcare facilities is also a problem.

Participant 6: We found a pile of discarded medicines in the garbage. We investigated and discovered they belonged to a company with offices outside the governorate. An unauthorized satellite channel broadcasted this, claiming it's the situation in areas under the legitimate government's control – medicines thrown in the garbage.”

4.1.4 Innovation Design

The current design of community engagement interventions for dengue control depending on the direct communication with the community through door-to-door

education by health workers and community volunteers. Participant No 11 working at Aden governorate health office said:

"From the beginning of endemic outbreaks in Aden after the war, we found no solution except involving the community through direct contact and community educators who w ork on educating the community directly or through community mobilization"

4.1.5 Innovation Cost

Participants generally considered community engagement as low-cost intervention compared to other dengue prevention and control methods. Moreover, the organization consultant with 30 years of experience in community engagement and social behaviour changes interventions stated:

"*Involving the community is easy and difficult at the same time and is considered the cheapest cost for two reasons. The first is that any community training is not considered a loss, even if it is not used in the same area, because I have empowered someone who can carry the message to any area and any topic I can give them to spread awareness. The second point is that our criteria for selecting individuals are weak because there is a high dropout rate, which is costly. When we choose close friends, they don't work, and the financial return for the community engagement worker is very low compared to others, and we lose a lot because the selection was wrong from the beginning"*

4.1 Outer setting domain:

4.2.1 Critical Incidents

The research identified several critical incidents that's may lead to stop the community engagement interventions. The conflict situation and its effect on community engagement through the following five reasons:

Security problems: Participants talked about the security concern due to sudden armed conflict between different parties or from one of the armed groups. Also, could be as a result of rumours or as a personal behaviour, participant No 3 from female community committee at FGD 3 describe her experience by

"In the previous campaign, the vaccination team refused to go to one of the neighbourhoods. When we asked why, they told us that during the preceding campaign, a man had physically and verbally assaulted one of the female volunteers. The man was reported to the police, but the volunteers are now afraid to work in that area."

Duality of Government Authorities: The ongoing conflict has created complex political situation with competing authorities. The legitimate government who supports community engagement effort in vaccine campaign and the Houthi militia who have antivaccine health policy. On top of that the government sectors disagreement whether the dengue control effort is the responsibility of health office only or it is water management, agriculture, or sharing responsibility, the participant No 12 which is working as executive director of local organization said:

"Armed conflicts are considered the most important obstacles, along with the accompanying duality of authority. Each authority considers the activity to be its own, whether it is water management, agriculture. There were problems that had an impact, but now the work has become clearer."

Internally Displaced Person (IDP) Movement and Illegal Immigration: Community committee members referred health and public service problems as consequences of increase numbers of immigrants and internal displeased people.

"Some overflows still persist due to the lack of response because of the presence of marginalized and displaced people, which has caused a disaster for the entire community." participant No 3 -female FGD

Sewage and WASH Services Problems: Participants highlighted the strong connection between inadequate sanitation and the spread of *dengue mosquito*. In addition, they linked sewage problems with vector-borne disease to the lack of resources and increase number of people which cause sewages overflows. As female participants from Dar Sa'ad district community committee said:

Participant 8*: "First, to get rid of these diseases, we need street cleanliness and proper sewage management because they lead to outbreaks."*

Participant 14: *"The environment itself causes these diseases due to the presence of sewage and garbage."* Likewise participant No 11 working at Aden health office state

"*When we communicated with the community and involved them in opinions and discus sions, the feedback was that they were unaware of the problem and that its causes were garbage or sewage, and that they were the ones creating this mosquito in their homes. The problem started when people left their homes at the time of war and left open containers with water".*

Interrupted Funding: Participants expressed concern about lack of financial resources and interrupted funding from donors, often due to change priorities or emergency situations .Participant No 5 worked in NMCP and currently working as organization consultant stated:

"Sudden cessation of support due to weak funding or changing priorities of implementing organizations, such as what happened during the Corona pandemic, with some funding for specific activities being diverted to activities related to COVID-19.

4.2.2 Local Attitudes

Participants generally agreed about community attitudes towards collaboration and willingness to help. Which improved with increased of dengue incidence. However, the conflict situation negatively impacts community behaviour. Participants debated the root causes of this behaviour change, some attributing it to material demands created from conflict while others sew it as consequence of negative humanitarian interventions design. Participant No 11 working at Aden Governorate for 11 years agreed about the community behaviour change due to economic need and she also noticed a change in the education massage. When the principal investigator asks her when did she start feeling the existence of material demands from the community while delivering the educational message? Her response was "*Yes, this is a good question. In comparison to before 2015, awareness focused on natural satisfaction, environmental health, extracting birth certificates, education, school dropouts, healthy nutrition, and everything that builds human health and development. There were no great material demands like now due to displacement, aid, and poverty. Families say, "What will we do with the educational message? We want materials and food. This happened after the war. Before 2015, we used to raise awareness among mothers, and the mothers themselves used to spread awareness and mosque preachers without compensation"* similarly, participants No 2 and No 3 from community committee of AL-Mansoura district have said: *"After the war, people became more materialistic. As community committees, our work is voluntary, and people constantly inquire about compensation"* and after he finished the participant No 3 responded to his point by "*I don't believe people have become inherently materialistic. The situation forced them to be this way. The situation was good before the war. After the war, prices skyrocketed. When you ask something of someone, they expect financial compensation because they could spend that time earning money."* Finally, participant No 5 working as organization consultant believes the community behaviour changed due to relief interventions from organization

aid. *"We also found that the community's response to many awareness projects after 2015 was affected by other relief interventions, and their demands for in-kind assistance and other things became greater than their interest in health awareness"*

Community committee are welcoming fogging interventions for *mosquito* elimination rather than community awareness campaign and they express more preferences to the traditional treatment rather than doctor medicine as male participant from community committee at Al-Mansoura stated: "*We are now planting papaya trees in our homes and encouraging others to do the same. Papaya leaves have been proven to increase platelet count in a short period. I've personally tried it on 38 cases. Because they increase platelet count, which is crucial during outbreaks. I started about a year and a half ago. An Indian man told me that his daughter was sick, and he had spent around 6,000 riyals on her treatment without success. Then someone suggested papaya leaves, and he tried it. His daughter's condition improved. I was once at a pharmacy and saw a young girl with a high fever and a low platelet count. We went to the same Indian man and got papaya leaves from the same source. The girl's condition improved as well."*
Additionally, misunderstanding and stigma due to connection between personal hygiene and *mosquito diseases* are present.

4.2.3 Local Conditions

The research finding highlighted the connection between local attitudes and local context. Participants response agreed about the negative effect for the current economic status such as increase prices, decrease currency value, delay of government salaries and their overall lifestyle*." The impact is undoubtedly negative. Many people have limited incomes and cannot afford medication. They resort to herbal remedies, which affects their health. We need to activate health centres in neighbourhoods. They exist in most areas but lack essential medicines. I once visited a health centre where a child needed fever-reducing medication, which they couldn't provide. I had to get it myself. Before 2011, a teacher's salary was around 500-600 dollars. Today, it doesn't exceed 80 dollars. This has undoubtedly had a significant impact. The situation has reached a point where everyone, even government employees, demands financial compensation for services. We've encountered this with several government entities."* Participant No 7 Male Community Committee FGD.

The political factor also plays important role in the health condition as one of the participants said: the political situation is affecting all aspect of their life and other participant refer about the politicization of health. *"Politicization of healthcare is a problem. It becomes a battleground for different parties. For instance, if a particular party controls the health sector, individuals manipulate it for their party's benefit. This is wrong"* Participant No 3 Male Community Committee FGD.

Participants have noticed the environmental causes impact such as rainfalls and floods that followed by increase number of dengue disease cases
"The most important obstacle is resources because the cadres are available, whether material or in-kind resources for example, if floods or rain occur, you need equipment that is not available, and we need water, sanitation, and works. Also, people's interaction, and just as they interacted to eliminate the Houthis, we want their interaction to eliminate the disease.." Participant No 10 Aden health Office

4.2.4 Partnerships & Connections

The connection and partnership also, affected by war and the connection between different health sectors is disrupted. Which is currently occurs through health clusters organized by international organizations, The legalization policy of connection and partnership is not activated. Participants comment was different and each participant category have their own issue with communication , participant No 15 organizations consultants was working with United Nations International Children's Emergency Fund (UNICEF) explained the issue of trust and communication between government sectors and not having one database for all health volunteers and the executive director of local organization explained the problem of personal whims and self-interest of some of government employee also, the community committee shows different response, one district are satisfied about their communication with district health office and the others are not . the participant No 2 working at national malaria program for 25 years said:
"Unfortunately, several workshops have been held previously on sectoral coordination, especially for the vector problem, and discussing relevant authorities, civil society organizations, and other organizations. But after they ended, nothing was achieved due to the lack of necessary decisions for their implementation by those concerned. Before the political problems, there was a sectoral coordination committee that issued a decision at the ministry level and was under the umbrella of the care sector and relevant authorities. The dengue problem represents a burden on the Malaria Program and was

assigned to deal with it because of the logistical resources that enable it to deal with it; otherwise, it is actually the responsibility of another department. Unfortunately, thinking about the financial aspect from different authorities has become dominant, and often people's attendance and interaction are determined by this aspect."

However, with problems of connection and partnership a new initiative shows some improvement. The initiative conducted by the national program for health education and information using WhatsApp groups to communicate with different stakeholders.

" We have a WhatsApp group whose members are from relevant supporting organizations and specialized government agencies. We started it in 2022, and the response to it was great during the vaccination campaigns." Participant No 8 MoPHP Employee

4.2.5 Policies & Laws

Participants were unaware of any information related to current health policy or regulations related to community engagement. However, the participant No 7 working as organization consultant for the academic field referred to the public health law that regulate health system and the community engagement is one of the components, in addition, the participant No 15 working as organization consultant talked about old regulation explained in details the role of community in health. Currently there are general custom regulate community volunteer work and community engagement in general. With new regulation from Aden governor to establish community committee work as partnership between community and Aden governorate. And the participant No 13 working in the health office of Al-Mansoura District said:

"As for us, the establishment of community committees by a decision from the governor of the governorate. They have a central department in the governorate and encourage their participation in any health aspect."

4.2.6 Financing

Participants from organizations category highlighted potential opportunities for securing funding from the international organization, particularly those focused on social behaviour change interventions. However, they also expressed concerns about lack of

interest and vison from MoPHP on social behaviour change and low quality of interventions proposals.

"*Opportunities exist, but when priorities shift, for example, when preventive interventions are not a priority, community behaviour change becomes secondary as well. The Ministry of Public Health and Population does not provide specific visions for the continuity of activities. As for donors, they respond to the state's needs."* Participant No 15 (Organization Consultant).

There were many success experiences of business owners and charity and local organizations of supporting health interventions as the participant No 13 said: *"Community participation interventions can be implemented through charities, businessmen, and financiers. As for me and my work in the health centre, there was sympathy from businessmen and financiers. Everyone knows that we do not have anything. During Ramadan, I was able to set up a Ramadan medical camp for people with chronic diseases and dispensed free medicines at a cost of 20 million Yemeni rials."*

4.2.7 External pressures

We think there was a lack of understanding of the external pressure construct, which makes most of the participants to answer "there is no external pressure." Participants who understood the question correctly responded with two opinions one is positive and those believe increase dengue incidence and international organization interest on SBC interventions in addition the availability of community participation concepts before are making positive pressure and the other opinions of negative pressure is mainly due to financial problems and spread of
rumours.*"the rapid spread of negative rumors affects the implementation of health activities"* Participant No 5 (organization Consultant)

4.3 Inner setting domain

4.3.1 Work Infrastructure

Participants expressed concern about the lack of institutional work for community engagement interventions. This lack of structure led to conflicts between health bodies (Ministry of public health and population, Aden health office and district health offices) each tries to leverage the weakness in the institutional work to their own advantage. Furthermore, participants identified challenges in selecting community volunteers, such as, favouritism, friendship, relative or money benefit in fact the research participants estimated their percentage from 40-50% of the total health volunteers working in community engagement as Participant No 10 working at Aden health Office stated: *"This issue arises due to living conditions. When volunteers are needed to spread a health message, we find that people bring their relatives. We have no problem with that, but the person must be able to complete the tasks required from him, and there should be no selfishness and monopolization of the choice for relatives. We try as much as possible to make the percentage less than 50%, and to be realistic, if I have a qualified cadre in my family, I will include him, not just anyone, but a cadre who can provide the service. I do not say that there is corruption or deficiencies in Aden Governorate, this thing exists, but not in a rampant way If you ask me about Aden, it is in a better condition than the rest of the governorates."*

4.3.2 Relational Connections

The relationship at the inner setting of community engagement interventions various from one level to others and from different people at the same level of work, generally it appears there is a kind of good friendship and mutual respect the participant No 1 working at the NMCP said:

"We are working to create a team spirit where the work is friendly, but I don't think we have reached the point of working as one team yet."

4.3.3 Communications

Formal and non-formal communication is there, and the friendly communication is more dominant, However the communication intensity increased when the dengue season start as the Participant No 10 working as organization consultant said: *"The communication mechanism is good, but its drawback is seasonality. For example, if dengue fever spreads, there will be a request to design messages and print awareness*

brochures. The drawback is that we don't try to continue this during other times. Regarding communication currently, there is a health-specific meeting almost weekly, and it is about vaccinations, but we discuss everything related to community behaviour change."

4.3.4 Culture

Participants expressed varying level of satisfaction with work culture across different categories. Organization employees generally reported positive experiences, while government employee expressed concerns about lack of collaboration, commitment to policies and qualified people.

" There is a shortcoming and lack of understanding of the philosophy and nature of work, which is a problem. When there are laws, tasks, and duties, and there are no work policies and procedures, that is a disaster." Participant No 9 MoPHP. Likewise Participant No 2 working at the NMCP program said:

"Unfortunately, our work culture is very low because our work happens during outbreaks, and responses to outbreaks are also delayed. I believe the solution to improve our work culture is through institutional work, where each department performs its role correctly and as required."

4.3.5 Tension for change

Conflict consequence makes community engagement the best solutions and absence of operational budget make more tension to that.

"From the beginning of endemic outbreaks in Aden after the war, we found no solution except involving the community through direct contact and community educators who work on educating the community directly or through community mobilization." Participant No 11 working at Aden health office. Likewise, a participant No 13 said:

"When you live in a certain situation, such as our situation in Yemen in general, with the absence of an operational budget, we need community participation to solve many problems"

4.3.6 Relative Priority

Participants acknowledged the importance of community engagement as prevention measures. However, priorities differed between health authorities. The National Malaria Control Program NMCP prioritise prevention effort and fogging and considering the

community engagement interventions as a secondary option. In contrast, the Health Education and Information Program prioritized community engagement and faced challenges in involving in vector-borne disease work, participant No 9 working in the national education and information program said:

"In reality, the National Malaria Control Program focuses more on the control aspect, and the awareness aspect, which is considered essential, is considered secondary if there is an increase in funding, especially for awareness. If there is no increase, they turn to fogging.

Consequently, this is affecting the work of funding organizations. For instance, the WHO is mainly supporting the prevention effort through fogging and bed net distribution. On the other hand, UNICEF prioritise community engagement and SBC interventions on diseases other than vector-borne diseases as a Participant No. 1 working at NMCP said:

"I believe that community engagement is a priority, but donor agencies are slow to provide funding even when outbreaks occur. When we try to involve the community, the problem has already started to diminish due to climatic factors, and it becomes difficult to use community actors such as community leaders or others because they know that the problem has started to decrease and it is difficult for the community to accept messages from them".

4.3.7 Incentive Systems

Community engagement interventions for dengue control is depending on community volunteers, who receive incentivise for their work. However, participant No. 15 working as organization consultant at SBC, expressed concern that this practice could undermine the principle of volunteering and lead to financial burdens.

"We don't just need to increase incentives; we need to rethink how volunteers work. For example, instead of contracting with them for four sessions per month, if I have a mosque and school and they receive a monthly salary, the imam or teacher can be responsible for community awareness. But due to lack of interaction with us, the health volunteer asks for a monthly salary. If we calculate $50 for 4,000 volunteers, the monthly amount comes out to be high, and a large part of the campaign budget goes to the volunteers. Also, the lack of unification of volunteer data causes a high cost because volunteers currently receive financial incentives from multiple sources under different programs, and there is often duplication of names".

Moreover, Participants think moral incentives and personal recognition workshops and training for the people participating on community engagement interventions can also play role to motivate community volunteers as the community committee member from AL-Mansoura said:

"Success in campaigns often reaches high levels. Why don't we see recognition and appreciation for those who contributed to this success? We see plenty of recognition ceremonies, but those contributing to achievements are overlooked. We don't seek personal glory, but some are rewarded financially, while others would appreciate a certificate of appreciation to motivate their efforts."

4.3.8 Available Resources

Participants highlighted the reliance on international funding for community engagement. They suggested that government could provide additional funding through taxes, and that community participation could encourage business owners and charitable to contribute to health interventions participant No. 15-organization consultant said:

"When we talk about dengue fever in Aden, for example, there is no invoice in Aden that doesn't have a sanitation and city improvement clause, and no truck enters Aden without paying sanitation and city improvement taxes. If this money were considered a source for city improvement and a portion allocated to community behaviour change, and many business houses have moved their businesses from Sana'a to Aden, but we haven't benefited from that as we should." In addition, as the participant No. 5 working as organization consultant highlighted the important of using the available tangible resources

"If each district could rely on its income, it could carry out many health activities and interventions through taxes provided by various commercial projects within it, with the possibility of utilizing the governorate's resources and benefiting from them in the health sector like other sectors. Also, coordination with organizations working in these directorates so that they can benefit from the resources available to them and submit their requests to be included in the organization's annual plan, and this will only be through their effective communication with them and repeatedly demonstrating the health need to them."

4.3.9 Access to Knowledge & Information

Participants expressed their need of training and resource, including toolkits and guidelines on community engagement as the participant No. 7 which working as Academic consultant for organizations.

"We have not received any training in this area, but we have acquired knowledge and skills through self-improvement and my role as an academic with the National Center for Health Education and Media and the General Directorate of Family Health through my participation with them in developing some guides and training some community components, such as journalists, mosque imams, and providers of what is called community care at the Ministry of Social Affairs. I am not aware of the existence of any locally or nationally prepared guides on this subject."

4.4 Individual domain

The purpose of this domain is to understand perception of the research participants about the individuals responsible for community engagement interventions and their needs, capabilities, and motivations. It divided into three main categories policymakers, implementers, and influencing or opinion leaders.

4.4.1 Policymakers

Participants from MoPHP category. considered the decision of implementing community engagement intervention as multisectoral responsibility. Participant No. 9 said: *"The Ministry of Public Health and Population, represented by the Minister of Public Health and Population, the Governor of Aden Governorate, the Ministry of Finance, the Ministry of Education, and the Ministry of Water all have important roles in adopting the decision because they are related to the problem itself"* Nevertheless, community committee category thinks it's a Ministry of Public health and Population MoPHP responsibility then Aden health office and local authority (governor) responsibility as a participant No. 4 stated:

"Local authority, the Public Health and Population Office, the Health Office at the district level, and the community committees are responsible on community engagement interventions decision."

4.4.1.1 Policymaker need

Participants generally believes community engagement intervention aligned with policymakers needs and serve their interest because it will decrease morbidity and mortality rate. However, the participant No. 15 organization consultant, have a similar believe with doubt in the implementation aspect because of financial burden as he stated: *"The community engagement interventions decision serves them, but unfortunately, the implementation doesn't serve them. For example, the Minister of Local Administration or the Minister of Public Health and Population might ask, when community committees are involved, what will you give them? Each of them might see this as a burden on his ministry, and has a different priority than the other, despite their knowledge of their need for each other. During implementation and the funding stage, both sides avoid this"* similarly, participant No. 2 working at NMCP said: *". The dengue problem represents a burden on the Malaria Program and was assigned to deal with it because of the logistical resources that enable it to deal with it; otherwise, it is actually the responsibility of another department. Unfortunately, thinking about the financial aspect from different authorities has become dominant, and often people's attendance and interaction are determined by this aspect."*

4.4.1.2 Policymaker capability

While the participants No. 5,7,15 working as organizations consultant think, lack capability of policymakers *"I think there is a gap here, especially the gap with a high probability of not understanding the new approach adopted by many countries, which is behaviour change communication. There is a strong possibility that a need for capacity building in this area is present"* Participant No. 7

The participants No. 3,4,12 and most of community committee participants have good impression about policymakers' capabilities

"Certainly, they wouldn't have reached these positions without having the necessary skills and knowledge." Participant 3 community committee -Male

4.4.1.3 Policymaker motivation

Participants opinion fluctuated; some believe policymakers are not motivated, while others think they motivated or conditionally motivated if the financial aspect is

present or the epidemiological condition shows high incidence as the participant from female community committee members said:

Participant No. 6: *"They are only motivated when external entities like NGOs incentivize them".*

Participant No. 2*: "If an outbreak occurs, they might appear motivated."*

4.4.2 Implementation Team Members

Participants identified health volunteer and community committees as key players with importance of collaboration role with governorate and district health office and other related sectors as the participant No. 9 stated:

"National Malaria Program, Water and Sanitation Department, Awqaf Office, Education and Training Office, and the National Centre for Health Education and Information are undoubtedly all involved in the implementation."

4.4.2.1 Implementation team Capability

Participant opinions change from one to another some of them believe they have the capability and others don't (they need training) as the participant No. 12 working as executive director for local organization said:

"*As a government, they are experienced, each in their field. As for organizations, the situation is different. They may be experienced and competent, but they may also be young and hardworking. These differences exist in any system. However, as a government official, a person does not reach the position of a certain sector manager or a certain center without possessing the experience."*

When the researcher asks has the current situation affected the selection process? She laughs and spoke: *Yes, the political orientation imposing people based on their political backgrounds exist in the government sector, but not in* organizations."

4.4.2.2 Implementation team motivation

Participants think that implementation team are generally motivated and the participant No. 7 working as organization consultant highlighted the effect of the financial return and epidemiological situation on their motivation level.

"Often, people are influenced by their suffering. When you find that the people present in the community, these influential elements, experience pain or feel and touch the pain experienced by individuals and families through these infections,

their level of enthusiasm increases somewhat. However, reservations, motivation, readiness, and willingness increase even more when you make their need a priority. Sometimes, this motivates them more than decision-makers because they feel this is also linked to their problem. Also, when they work in the field, their personal income increases "

4.4.3 Opinion Leaders

Participants recognize individuals as Prime Minister office, Aden Governorate local council and Aden Governor have the current influence on the policy makers and implementers. *"Theoretically, it should be the community and its needs, but practically, in the current situation, it is either the highest decision-maker, with the understanding existing within the government leadership, who puts the Ministry of Health on the spot, stating that this is a binding decision from the government, the Council of Ministers, that the Ministry of Health prioritizes this issue. Another factor is the local authorities, represented by governors and others, making this issue a priority in communicating with the health office or even the Prime Minister's office. Thirdly, when this issue becomes linked to more than one party, such as when this issue becomes a priority for public health outside the country's framework, it requires a response and community engagement with these concerns*. Participant No. 7 academic organization consultant.

In addition, participants think religious people have the influence in the community engagement. Moreover, participant No. 1 working at NMCP for the last 20 years believe the major influence for all individuals is the financial aspect

"In our current situation and society, the influencers are stakeholders who have material interests. They will strongly encourage and support the work, and if there are no benefits or material interests, they may push for complete cancellation of the implementation. This applies in general to the entire health pyramid, from the ministry to the National Malaria Control Program, down to the base of the pyramid"

4.5 Implementation process domain

4.5.1 Teaming

Participants noted a lack of consistent coordination and collaboration among sectors responsible for community engagement intervention in dengue control, However, cooperation mainly occur when the dengue endemic happens as participant No. 10 said: "*cooperation and partnership and coordination occur when the alarm bell rings, all efforts are mobilized. There is responsiveness, and we are led by the governor of the governorate, and when there is danger, efforts are mobilized, and all responsible authorities are called upon, and an operations room is formed, and each party does its work*"

A major issue affecting teaming during implementation is implicit nomination of some individuals to be part of the implementation team either from responsible individual to nominates their relatives, friends, or from political parties to nominate their members. Participant No. 2 working with NMCP stated:

"What is happening now in terms of interference in the selection of candidates by influential parties in nominating names directly reflects negatively on the quality of work and the effectiveness of delivering the message. I believe it is necessary to set criteria and qualifications for the participating individuals to avoid any problems".

likewise, a participant No. 6 working with international organization said:

"Yemen is going through several problems, the most important of which are primarily political. As a result, some individuals do not prioritize the public interest over private interests, and this constitutes a major obstacle in the matter of coordination."

4.5.2 Assessing Needs

Participants emphasized the importance of having clear plan and objectives for engaging the community in dengue control as the participant No. 7 and working as organization consultant said:

"The first priority is to clearly and specifically define the problem, describing it scientifically. Second, the infrastructure and resources needed, not just money, but human resources, educational materials, and the ability to reach the edges of cities, as work is sometimes done in easily accessible areas, while cases and deaths occur at the edges." Likewise, participant No. 6 working at international organization said:

"The most important priority is to set a specific goal and specific outcomes to be achiev

ed and to monitor this with the correct indicators that help us analyse implementation c orrectly." In addition, participants focus on the importance of having active collaborative work policy as the participant No. 15 working as organization consultant said: "*If formal decisions were made or if the formal decisions issued in the 1990s were taken after reviewing and updating them with experts, then two to three days of meetings for policymakers to approve them, after approval, everyone will know their responsibilities. We will then have joint coordination with various sectors."*

Lastly, a participant talks about the importance of having capacity building on community engagement for dengue control.

"The first priority is good coordination between the National Malaria Control Centre and the Health Education and Information Center. Second, building the capacity of the National Health Education and Information Center staff to combat vectors in general. Third, training volunteers and community figures on dengue fever." participant No. 8

4.5.3 Assessing Context

The research participants identified key contextual barriers and facilitators to successful implementation of community engagement for dengue control. The main barriers are :

Conflict consequences, such as lack of coordination and resources availability and personal interest:

"First, armed groups, false rumours, and lack of capabilities to reach the community. The unhealthy environment and infrastructure are considered an obstacle because the community is disgruntled and their thinking goes to material things". Participant No. 11

"The main obstacles are full coordination with other relevant ministries, as well as the Ministry of Health providing high-quality recommendations to convince donors to submit proposals. Additionally, there is a lack of dedicated support for the ministry that it can rely on to deal with emergencies" Participant No, 6

"The most important obstacle is resources, whether material or in-kind resources. For example, if floods or rain occur, you need equipment that is not available, and we need participation from all partner sectors, such as water, sanitation, and works. Also, people's interaction, and just as they interacted to eliminate the Houthis, we want their interaction to eliminate the disease." Participant No. 10

"The most important obstacle is that the candidates for implementation from some health offices do not have sufficient experience and knowledge of the work. Also,

unfortunately, the decision-maker is interested in ensuring that their name is on the payroll, and then they do not perform the tasks and responsibilities assigned to them, and this constitutes a burden and additional responsibilities on us."
Participant No. 2

The perception of some participants about low literacy level of community members and low knowledge of community engagement and SBC concepts which affects key stakeholders believes in the importance of community engagement and SBC as the participant No. 9 stated:

"Official bodies need to believe that citizens should be partners, not just recipients. Unfortunately, over many years, we have turned citizens into recipients, and they have become accustomed to demanding services, even though they are the ones who will be affected. Official bodies need to give citizens a role and give a role to organizations that work in communities so that they can adopt ideas and thus have a greater impact. The problem of dengue fever is a community engagement problem, and the solution is to change behaviour. There need to be laws, and mosques and schools need to be involved. Otherwise, the problems of malaria and dengue will continue indefinitely."

Additionally, participants identified the facilitators as :

Increased awareness among policymakers about the importance of involving community committee members in community awareness intervention.

"The first thing we see is that the relevant entities responsible for developing policies and plans related to the prevention of these diseases and controlling their spread need to adopt this new approach, which many countries have embraced and which is also supported by several UN organizations. They strive to make all their projects and programs with their partners in intervention countries fall under the umbrella of "behaviour change communication" and do not support any type of communication that simply raises awareness by using previous conventional awareness-raising methods." Participation No. 7

Moreover, the international organization interest in community engagement and social behaviour changes activities as essential elements for sustainable health interventions .

"*There is a trend towards focusing on community engagement, and it is often br ought up. There is also a relationship between malaria and dengue interventions*

. The quality of the proposals submitted to donor agencies is what determines th e quality of work in general." Participant No. 6

Furthermore, the previous experience in community engagement approach which was used from different authorities to arrange people life, as the Participant No. 15 said:

"*The existence of a previous experience. It is not new. When we talk about Yemen in the past, north and south, there were cooperatives and local councils. What we need is to prepare the circumstances by studying successful experiences, the reasons for their success, and their major obstacles. Then, we can work."*

Lastly, the potential benefit from other interventions supporting the activities such as humanitarians and health aid which can be used for enhancing community engagement process.

"Adding the principle of conditional need through cooperation with various donor agencies and what they provide in terms of cleaning supplies, food baskets, and other assistance provided to citizens, and linking it to participation in the health aspect and disease prevention, so that there is integration between the two processes and greater utilization of available opportunities to serve the interests of the community" participants No. 5

4.5.4 Planning

As the assessing needs construct shows, participants identified lack of shared plan or vision for community engagement interventions, particularly for dengue control, and they attributed this to lack of fund or in good planning. As the participant No. 10 working at Aden health office said:

"If you look at the plans, some of the most wonderful plans exist in Yemen, but they are not realistic or implementable. However, when making a simple and implementable plan, the situation can be adapted accordingly. We have plans in care and immunization for epidemics with other partners from different sectors. And we have a confrontation work plan from the health sector, and we have epidemiologists, health education and media, where the community aspect is part of this plan." similarly, participant No. 8 working with ministry of health and population said:

"We have a draft work strategy for the National Health Education and Information Center for five years in various aspects. We prepared it about a year ago with one of the national experts, and due to internal administrative disagreements, the

adoption of the workshop to discuss this strategy was delayed. The failure of this strategy to become a reality due to the lack of funding to hold the workshop for the national strategy. We also have the annual plan for 2024."

4.5.5 Tailoring Strategies

Participants proposed three main strategies to improve and comprehend community engagement intervention.

1. Political commitment and Resources mobilization:
   "To have central decisions to involve all civil society organizations and all their factions by involving them in every health activity." Participant No. 13
2. Community Engagement and Business owners:
   "In addition to what I mentioned about the importance of involving schools, weekly awareness radio and television programs or through health facilities by educating patients or their companions in health centers may play a role in alleviating the problem." Participant No. 1
3. Developing communication and coordination plan:

"*One of the most important strategies is to have organized communication lines, organized work, real partnership to identify influential elements within the community for implementation, planning, thinking, and searching for resources for such a strategy."* Participant No. P7

"Adding the principle of conditional need through cooperation with various donor agencies and what they provide in terms of cleaning supplies, food baskets, and other assistance provided to citizens, and linking it to participation in the health aspect and disease prevention, so that there is integration between the two processes and greater utilization of available opportunities to serve the interests of the community." Participant No. 5

4.5.6 Reflecting & Evaluating

Participant suggested three main ways for mentoring and evaluating community engagement interventions, including:

1. Following the epidemiological and surveillance data

"*Usually, we use evaluation tools, which are epidemiological surveillance statistics and observation by female volunteers and direct contact. For us, we have an epidem*

iological week in which we monitor cases from the beginning of the activity until its end, and also the records in health centers. The best are statistics, observation, and feedback from the target audience themselves." Participant No. 11

2. Field observation

   "Field supervisory visits, a complaint box from the community, and direct comm unication with the community through the hotline or social media tools." Participant No. 12

3. Clear indicators

   "The appropriate way is to have clear definitions of the person responsible for this. Today, you find that many partner organizations, ministries, and international organizations find that this component has become a prominent feature with its independent plan and independent resources. It is a matter of follow-up and evaluation. It should be clear plans with specific objectives, indicators that make it easy for the person responsible for follow-up and evaluation to track these indicators every day until they reach their goal." Participant No. 7

4.5.7 Adapting

To adapt community engagement interventions for dengue control with Aden governorate context the participants suggested to implement the following modification.

Inner setting adaptation:

1- Enhancing collaboration and social behaviour change concept by developing clear policies for all health intervention to facilitate community engagement process and supporting organizations work. the participants No. 5,7,12 has said:

   "Adding the principle of conditional need through cooperation with various donor agencies and what they provide in terms of cleaning supplies, food baskets, and other assistance provided to citizens, and linking it to participation in the health aspect and disease prevention, so that there is integration between the two processes and greater utilization of available opportunities to serve the interests of the community" participants No. 5

"The first thing we see is that the relevant entities responsible for developing policies and plans related to the prevention of these diseases and controlling their spread need to adopt this new approach, which many countries have embraced and which is also supported by several UN organizations. They strive to make all their projects and programs with their partners in intervention countries fall under the umbrella of "behaviour change communication" and do not support any type of communication that simply raises awareness by using previous conventional awareness-raising methods." participants No. 7

"That it is imposed by government agencies that community engagement is included in the implemented projects. As long as the government has a clear work policy, it has the right to impose it on donors. Also, the local authority and its role in going down to the agencies and implementing organizations regarding the importance of community engagement". Participant No. 12.

2- Encourage Community Ownership by increasing community roles in health interventions and understanding their needs as the participant No. 1 from community committee at Dar Sa'ad stated:

"The community is the main reason for sustainability. When they feel that the project belongs to them, they will preserve it." Participant 1, Likewise the participant No. 5 which has being successfully experienced that *"If the community feels that the project is built on their needs, it will be more sustainable. I observed this through the implementation of a previous project where we returned a month after the project ended and found that they were still adhering to the correct practices. Always, when the state implements the project, its sustainability is better."*

Innovation adaptation

1- Utilize available human and material resources by involving school students and mosque imams in community engagement and having benefits from the social media and government as well as the political parties media resources to enhance community engagement in health.

"We need to work together on this because the problem is that some people believe that health problems are solely the responsibility of the health sector. But there is a role for mosques and schools. Unfortunately, their role is

neglected and marginalized, and they are only used in emergencies. This role is actually crucial. In the past, there was school health, where health awareness sessions were held, but unfortunately, they are not available now. If these sessions were brought back, the children would return home from school and convey this information to their parents. The same applies to mosques. If mosques and schools interact, the activity would be very good" Participant No. 15 Organization consultant.

"*Involving mass media from television, newspapers, radio, and social media because it reaches people more than television and radio. The service must also be available when sending the message. It is difficult to talk about the proper storage of water or handwashing if water is not available. The same applies to measles and vaccines, in addition to involving other concerned authorities. Also, it should be taught in schools in the elementary grades about health education so that they receive information early. We demanded that there be a subject taught, and schools have the largest number of population groups"* Participant No. 11.

2- Improve community communication methods by using local actors, songs, cartoons and social media influencers also, getting benefits from other country experience on community engagement on dengue control.

"The modifications are to update and innovate the health message so that it reaches the ordinary citizen, as brochures and television have become very weak, and communication tools are only used by young people. Therefore, finding an innovative way to reach different segments of society through songs and the use of influencers and famous figures in society who are acceptable to everyone, such as Zanbaqa and others" Participant No. 12.

"*There are useful experiences in Africa, and I believe people are tired of brochure education and door-to door education methods. We can make cartoon films for children to be shown in schools and forums. Children can also be taught through the science curriculum, where they are educated and conduct extracurricular activities in homes to get rid of larvae. Additionally, creating a kind of competition between schools by holding a competition that*

encourages the elimination of larvae. Also, from what I saw in Singapore, they have partnerships with more than 25 entities, not just international organizations, but also with local merchants and other ministries."
Participant No. 2

Summary Table of Barriers and Facilitators for Community Engagement Interventions in Dengue Control in Aden Governorate: Insights from participants and CFIR framework analysis.

Table No. (2)

Theme	Sub-theme	Brief description	Barrier	Facilitator	Quote sample
Innovation domain	Evidence-Base	The innovation has robust evidence supporting its effectiveness	Lack of evidence-based knowledge	Good personal experiences	*"I am not aware of any scientific evidence [of the effectiveness of these interventions], but there have been many efforts and training courses conducted by the Ministry of Health and Population to involve the community for many years"* Participant No 9 (MoPHP)
	Relative Advantage	The innovation is better than other available innovations or current practice.	Doubt about the effectiveness and the purpose of current community engagement activities	Considered as a best strategy for dengue control	*"Awareness raising and community involvement in dengue control are crucial because we cannot fully control the vector or guarantee complete treatment. However, we can limit the problem by ensuring community participation".*
	Innovation Complexity	The innovation is complicated, which may be reflected by its scope and/or the nature and number of connections and steps.	Lack of financial budgets Negative effect of social media	There is no complexity at community engagement interventions	*"The community has lost trust due to the perceived relationship between doctors, pharmaceutical companies, and financial benefits, leading to a lack of confidence in medical advice"* Participant No. 6 FGD
	Innovation Design	The innovation is well designed and packaged, including how it is assembled, bundled, and presented.			"From the beginning of endemic outbreaks in Aden after the war, we found no solution except involving the community through direct contact and community educators who work on educating the community directly or through community mobilization" participant No. 11 working at Aden governorate health office
	Innovation Cost	The innovation purchase and operating costs are affordable.		low-cost intervention	"*Involving the community is easy and difficult at the same time and is considered the cheapest cost"* participant No. 15 NGO consultant

Theme	Sub-theme	Brief description	Barrier	Facilitator	Quote sample
Outer setting domain	Critical Incidents	Large-scale and/or unanticipated events disrupt implementation and/or delivery of the innovation	Conflict and it's consequences		*"Some overflows still persist due to the lack of response because of the presence of marginalized and displaced people, which has caused a disaster for the entire community."* participant No. 3 - female FGD
	Local Attitudes	Sociocultural values (e.g., shared responsibility in helping recipients) and beliefs (e.g., convictions about the worthiness of recipients) encourage the Outer Setting to support implementation and/or delivery of the innovation.	Negative behaviour change Preferring traditional treatment Hygiene stigma	Collaborative attitude of the community	*"We also found that the community's response to many awareness projects after 2015 was affected by other relief interventions, and their demands for in-kind assistance and other things became greater than their interest in health awareness"* participant No. 5 organization consultant
	Local Conditions	Economic, environmental, political, and/or technological conditions enable the Outer Setting to support implementation and/or delivery of the innovation.	Bad economic status. Political instability and health system politicization. Environmental and disease pandemic		*"Politicization of healthcare is a problem. It becomes a battleground for different parties. For instance, if a particular party controls the health sector, individuals manipulate it for their party's benefit. This is wrong"* Participant No. 3 Male Community Committee-FGD
	Partnerships & Connections	The Inner Setting is networked with external entities, including referral networks, academic	Inactivated legalization policy	Health clusters New technological initiative (WhatsApp)	*"Unfortunately, several workshops have been held previously on sectoral coordination, especially for the vector problem, and discussing relevant authorities, civil society organizations, and other organizations. But after they ended, nothing was achieved*

		affiliations, and professional organization networks.			*due to the lack of necessary decisions for their implementation by those concerned"* participant No. 2 NMCP.
	Policies & Laws	Legislation, regulations, professional group guidelines and recommendations, or accreditation standards support implementation and/or delivery of the innovation.	Absence of community engagement regulation in health	New regulation of community committee from Aden governor.	*" As for us, the establishment of community committees by a decision from the governor of the governorate. They have a central department in the governorate and encourage their participation in any health aspect."* participant No 13 working in the health office of Al-Mansoura District.
	Financing	Funding from external entities (e.g., grants, reimbursement) is available to implement and/or deliver the innovation.	lack of interest and vison from MoPHP Low quality of interventions proposals.	Funding from the international organization. Success experiences of business owners and charity	"*Opportunities exist, but when priorities shift, for example, when preventive interventions are not a priority, community behaviours change becomes secondary as well. The Ministry of Public Health and Population does not provide specific visions for the continuity of activities. As for donors, they respond to the state's needs."* Participant No. 15 Organization Consultant.
	External pressures	External pressures drive implementation and/or delivery of the innovation.	Financial problems Fast spread of rumours	Increase number dengue and interest on SBC. Availability of community participation concepts before	*"The rapid spread of negative rumors affects the implementation of health activities"* Participant No. 5 (organization Consultant)

Theme	Sub-theme	Brief description	Barrier	Facilitator	Quote sample
Inner setting domain	Work Infrastructure	Organization of tasks and responsibilities within and between individuals and teams, and general staffing levels, support functional performance of the Inner Setting	Lack of institutional work for community engagement interventions Issues in selecting community volunteers		"This issue arises due to living conditions. When volunteers are needed to spread a health message, we find that people bring their relatives. We have no problem with that, but the person must be able to complete the tasks required from him, and there should be no selfishness and monopolization of the choice for relatives. *We try as much as possible to make the percentage less than 50%, and to be realistic, if I have a qualified cadre in my family, I will include him, not just anyone, but a cadre who can provide the service.* Participant No. 10 working at Aden health Office
	Relational Connections	There are high quality formal and informal relationships, networks, and teams within and across Inner Setting boundaries (e.g., structural, professional).		Kind of good friendship and mutual respect	*"We are working to create a team spirit where the work is friendly, but I don't think we have reached the point of working as one team yet."* participant No. 1 working at the National Malaria Program
	Communications	There are high quality formal and informal information sharing practices within and across Inner Setting boundaries (e.g., structural, professional).	Friendly and seasonal communication is more dominant		*"The communication mechanism is good, but its drawback is seasonality."* Participant No. 10 working as organization consultant
	Culture	There are shared values, beliefs, and norms across the Inner Setting.	Poor satisfaction of work culture at the government category	Good satisfaction from organization employee	*" There is a shortcoming and lack of understanding of the philosophy and nature of work, which is a problem. When there are laws, tasks, and duties, and there are no work policies and procedures, that is a disaster."* Participant No. 9 MoPHP

	Tension for change	The current situation is intolerable and needs to change		Conflict consequence Absence of operational budget	*"From the beginning of endemic outbreaks in Aden after the war, we found no solution except involving the community through direct contact and community educators who work on educating the community directly or through community mobilization."* Participant No. 11 working at Aden health office
	Relative Priority	Implementing and delivering the innovation is important compared to other initiatives.	Difference in priorities between health authorities	Good understanding to the importance of community engagement	*"In reality, the National Malaria Control Program focuses more on the control aspect, and the awareness aspect, which is considered essential, is considered secondary if there is an increase in funding, especially for awareness. If there is no increase, they turn to fogging*. participant No. 9 working in the national education and information program MoPHP
	Incentive Systems	Tangible and/or intangible incentives and rewards and/or disincentives and punishments support implementation and delivery of the innovation.	Depending on community volunteers.	Moral incentives and personal recognition	*"Success in campaigns often reaches high levels. Why don't we see recognition and appreciation for those who contributed to this success? We see plenty of recognition ceremonies, but those contributing to achievements are overlooked. We don't seek personal glory, but some are rewarded financially, while others would appreciate a certificate of appreciation to motivate their efforts." community committee member from AL-Mansoura*
	Available Resources	Resources are available to implement and deliver the innovation	Depending on international fund	Funding resources through taxes, and f business owners and charity.	*"If each district could rely on its income, it could carry out many health activities and interventions through taxes provided by various commercial projects within it, with the possibility of utilizing the governorate's resources and benefiting from them in the health sector like other sectors. Also, coordination with organizations working in these directorates so that they can benefit from the resources available to them and submit their requests to be included in the organization's annual plan, and this will only be through their effective communication with them and repeatedly demonstrating the health need to them."* participant No. 5 working as organization consultant
	Access to Knowledge & Information	Guidance and/or training is accessible to implement and deliver the innovation.	Lack training and toolkits and guidelines	Participant awareness of training gap.	*"We have not received any training in this area, but we have acquired knowledge and skills through self-improvement and my role as an academic with the National Center for Health Education and Media and the General Directorate of Family Health through my participation with them in developing some guides and training some community*

					components, such as journalists, mosque imams, and providers of what is called community care at the Ministry of Social Affairs. I am not aware of the existence of any locally or nationally prepared guides on this subject." participant No. 7 working as Academic consultant for organizations.

Theme	Sub-theme	Brief description	Barrier	Facilitator	Quote sample
Individual domain	Policymakers	Individuals with a high level of authority, including key decision-makers, executive leaders, or directors	MoPHP responsibility then Aden health office and local authority (community perception)	Multisectoral responsibility (MoPHP category perception.)	*"Local authority, the Public Health and Population Office, the Health Office at the district level, and the community committees are responsible on community engagement interventions decision."* participant No. 4 community committee
	Policymaker need	The individual(s) has deficits related to survival, well-being, or personal fulfilment, which will be addressed by implementation and/or delivery of the innovation.	Implementation aspect doesn't align because of financial burden	Community engagement intervention aligned with policymakers needs	*". The dengue problem represents a burden on the Malaria Program and was assigned to deal with it because of the logistical resources that enable it to deal with it; otherwise, it is actually the responsibility of another department. Unfortunately, thinking about the financial aspect from different authorities has become dominant, and often people's attendance and interaction are determined by this aspect."* participant No. 2 working at NMCP
	Policy maker capability	The individual(s) has interpersonal competence, knowledge, and skills to fulfil Role	Lack of capability among policy maker	Good impression about policy maker capabilities	*"I think there is a gap here, especially the gap with a high probability of not understanding the new approach adopted by many countries, which is behaviour change communication. There is a strong possibility that a need for capacity building in this area is present"* Participant No. 7 working as organizations consultant
	Policy maker motivation	The individual(s) is committed to fulfilling Role.	Fluctuated opinion about their motivation		*"They are only motivated when external entities like NGOs incentivize them".* Famel Participant No. 6 community committee *"If an outbreak occurs, they might appear motivated."* Famel Participant No. 2 community committee

	Implementation Team Members	Individuals who collaborate with and support the Implementation Leads to implement the innovation, ideally including Innovation Deliverers and Recipients.		implementation is responsibility of health volunteer and community committee with importance of collaboration role with related sectors	*"National Malaria Program, Water and Sanitation Department, Awqaf Office, Education and Training Office, and the National Centre for Health Education and Information are undoubtedly all involved in the implementation."* participant No. 9 MoPHP
	Implementation team Capability	The individual(s) has interpersonal competence, knowledge, and skills to fulfil Role	Fluctuated opinion about Implementation team Capability		*"They are qualified and need courses to learn how to deal with different personalities to ensure that information reaches them"* Participant No. 3
	Implementation team motivation	The individual(s) is committed to fulfilling Role.		Implementation team are generally motivated with effect of the financial return, epidemiological situation	*"However, reservations, motivation, readiness, and willingness increase even more when you make their need a priority. Sometimes, this motivates them more than decision-makers because they feel this is also linked to their problem. Also, when they work in the field, their personal income increases"* participant No. 7 working as organization consultant
	Opinion Leaders			Prime minister office and Aden governorate local council, religious people have the current influence.	*"Theoretically, it should be the community and its needs, but practically, in the current situation, it is either the highest decision-maker, with the understanding existing within the government leadership, who puts the Ministry of Health on the spot. Another factor is the local authorities, represented by governors and others, making this issue a priority in communicating with the health office or even the Prime Minister's office. Thirdly, when this issue becomes linked to more than one party, such as when this issue becomes a priority for public health outside the country's framework, it requires a response and community engagement with these concerns*. Participant No. 7 academic organization consultant.

Theme	Sub-theme	Brief description	Barrier	Facilitator	Quote sample
Implementation process domain	Teaming	Join together, intentionally coordinating and collaborating on interdependent tasks, to implement the innovation.	Week coordination level		*"Yemen is going through several problems, the most important of which are primarily political. As a result, some individuals do not prioritize the public interest over private interests, and this constitutes a major obstacle in the matter of coordination."* participant No. 6 working with international organization
	Assessing Needs	Collect information about priorities, preferences, and needs of people		Participant awareness of importance of having clear plan and capacity building to engage the community in dengue control	"*If formal decisions were made or if the formal decisions issued in the 1990s were taken after reviewing and updating them with experts, then two to three days of meetings for policymakers to approve them, after approval, everyone will know their responsibilities. We will then have joint coordination with various sectors."* participant No. 15 and working as organization consultant
	Assessing Context	Collect information to identify and appraise barriers and facilitators to implementation and delivery of the innovation	Conflict consequences Lack of believes in the importance of community engagement and (SBC)	Increased awareness about involving community committee members NGOs interest on community engagement (SBC) activities Previous experience in community work	*"Official bodies need to believe that citizens should be partners, not just recipients. Unfortunately, over many years, we have turned citizens into recipients, and they have become accustomed to demanding services, even though they are the ones who will be affected. Official bodies need to give citizens a role and give a role to organizations that work in communities so that they can adopt ideas and thus have a greater impact. The problem of dengue fever is a community engagement problem, and the solution is to change behaviour. There need to be laws, and mosques and schools need to be involved. Otherwise, the problems of malaria and dengue will continue indefinitely."* Participant No. 9 MoPHP
	Planning	Identify roles and responsibilities, outline specific steps and milestones, and define goals and measures for implementation success in advance.	No shared plan or vision for community engagement interventions		*"We have a draft work strategy for the National Health Education and Information Center for five years in various aspects. We prepared it about a year ago with one of the national experts, and due to internal administrative disagreements, the adoption of the workshop to discuss this strategy was delayed"* participant No. 8 MoPHP

Stakeholders Mapping & Analysis
Table No. (3)

Stakeholder Category	Stakeholder Name	Role/Interest	Influence Level	Interest Level	Impact on Project	Notes
Ministry of public health MoPHP	National Malaria Program	Interventions planning and Monitoring	High	Low	Negative	Priorities fogging and bed net distribution on the community engagement
	Health information and education program	Interest in dengue education & Community engagement	Low	High	Positive	Prioritize community engagement and SBC activities
	Aden governorate health office	Interventions Implementation	Low	High	Neutral	They used to implement health interventions without any modification.
Organization	International organization	Funding and technical support	High	High	Negative	They usually influenced from policymakers in the MoPHP.
	National organization	Interventions Implementation	low	High	Neutral	They usually followings international organizations agendas.
Community leaders	Community committee	Support Interventions Implementation	Medium	High	Positive	Their selection nomination is affected by the political influence.
	Religious and traditional leaders	Support Interventions Implementation	High	Low	Neutral	More trusted from the community.
Government and political aspect	Central government	Coordinate different ministries work	High	Low	Neutral	
	Local government	Coordinate sectors work	High	Medium	Neutral	

Chapter 5: Discussion

5.1 Innovation domain

While there are national evidence supports community engagement (the Innovation) (49) and international evidence highlights the effectiveness of community engagement interventions for dengue control (50), the available evidence emphasizes the importance of community engagement in conflict and post conflict context (51,52) specifically, it underscores the significance of community engagement approaches in preventing infectious disease and dengue epidemics (8,53) However, the research participant indicated a lack of evidence-based knowledge and good impression on their personal experience with community engagement interventions, which align with study conducted by *Eva Turk and others*, acknowledge the advantages of community engagement interventions as an efficient method for responding to community needs (54) and as more sustainable strategy for dengue prevention and control (29,31,32). Nevertheless, our participants highlighted challenges such as the infodemic, lack of trust and financial constraints. These complexity resonate with finding from other researchers as barriers to community engagement interventions in conflict countries (51,55,56). Moreover, in Yemen door-to-door education strategy for vector-borne diseases have been used (30) evidence suggests a lack of community trust in the health system . participants also faced difficulties during door-to-door education in Aden governorate as result of spreading infodemic and security issues (56–58) Additionally, the cost of recruiting and training community health workers (51) raises the questions about the effectiveness of door-to-door education strategies for community engagement interventions in the current situation or for the conflict and post conflict context in general, and whether their effectiveness is differs between urban and rural areas.

5.2 Outer setting domain

The conflict context presents numerous critical incidents that hinder health interventions(59). Security problems due to presence of different armed groups in Aden governorate (55) potential acute conflict causing transportation problems (51) and unstable political condition affecting health system policies and priorities are significant obstacles (52,60) Furthermore, critical incidence have led to increases vector-borne diseases, such as upsurge numbers of IDPs (61–64) and reported water and sanitation

issues in Aden governorate (6,65–67). Lastly, the rapid spread of infodemic information has decreased health interventions effectiveness (57).

For the local attitude construct , our literature search revealed no existing information to interoperate our results, either from Yemen context or other similar context except the population's attitude toward utilizing traditional medicine (65,68).

The local condition of low economic and increase poverty (69) have negatively affected the community interest to health interventions (68). Qualitative case study in South Sudan and Haiti have highlighted negative behaviour changes in communities, such as losing community cohesion, lack of collaboration with community health workers and decreased desire to self-dependence due to inappropriate intervention design by international organization aid (70) This finding resonate with our research. Moreover, the weakness and politicization of Yemen's health system (7,71) are consequences of political impacts. Lastly, the environmental condition, including rainfall are directly effecting community engagement intervention(51,56).

Partnerships and connections between government sectors and international organizations have been greatly affected by conflict(52).Health system fragmentation(7) and weakened trust in government sectors(53,70) have led to the current partnership style through health clusters organized by international organization(72).Nevertheless, the effectiveness of these health clusters is questionable (60). On the other hand, using social media tools such as WhatsApp for connections shown success with similar context (73).
The Lack of human resources, corruption, uncertainty among stakeholders(10) and the absence of health policies and organizational structure within Yemen's health system (6,56) are major challenges. Before the conflict total health expenditure was low ,with health spending per capita grew from 25$ in 2000 to 80$ in 2014,then falling to 75$ in 2015 (6). Currently, financing health program relies on donors supports (6,7) Political support and clear empowerment plan for the ministry of health with different donors and community support, are crucial to overcome financing problems (74,75).

5.3 Inner setting domain

Governance fragmentation between Houthi in Northern Yemen and legitimate authority with the secessionist Southern Transitional Council (STC) in the south has weakened

the health system (1,2) and led to lack of communication, management, and institutional work (6,7,76). Additionally, stress, increase workloads, and economical pressure are affecting the overall working culture (55,77) . In conflict context, community engagement interventions are usually considered as low priority (78) . Offering high incentives for community volunteers or exceeding the salary limits for health workers has negative long-term outcomes for the health system (51,79,80) similarly, to over-dependence on external aid (70). While, much evidence focuses on the importance of capacity building in the conflict context (51,52,73,81), national evidence shows clear gap (56,60). No evidence was available for relational connection or tension to change constructs.

5.4 Individual domain

There is limited literature to interpret our research results related to the individual domain. Available evidence explains the implementers and opinion leaders view but not policymakers, However, our research participants indicate that health planning and donor fund allocation is mostly handled by the policymakers. National evidence highlights the role of governorate and district health office in implementing health interventions, with local authorities and governors as influencing factors (6). International evidence are emphasize the importance of involving traditional and community leaders(18,70). However, lack of motivation from community volunteers due to the economic needs is noted (51,82).

5.5 Implementation process domain

The implementation process is directly and indirectly affected by other four domains. Our findings suggests that coordination weaknesses between different level of authorities responsible for community engagement are mainly related to the health system politicization and the political unrest, as explained in the outer and inner domains (7,71,83,84). Research participants identified the need assessments to improve community engagement interventions(innovation delivery) due to lack of planning and capacity building, which resonates with other research findings as barriers in conflict settings (10,51,85).

Participants perception about barriers and facilitators of implementing community engagement interventions for dengue prevention and control are lack of recourse, and looking for personal benefit, these are considered as common consequences in conflict

and post conflict context (10,34,51,59) .Conversely, increased interest of community engagement and evidence of it is effectiveness in humanitarian contexts were seen as facilitators (86–88). Long-term planning or having a clear vison is challenging during fragile contexts (5,89) , an issue faced by our research participants.

The strategies suggested from by research participants to enhance community engagement interventions in dengue prevention and control include:

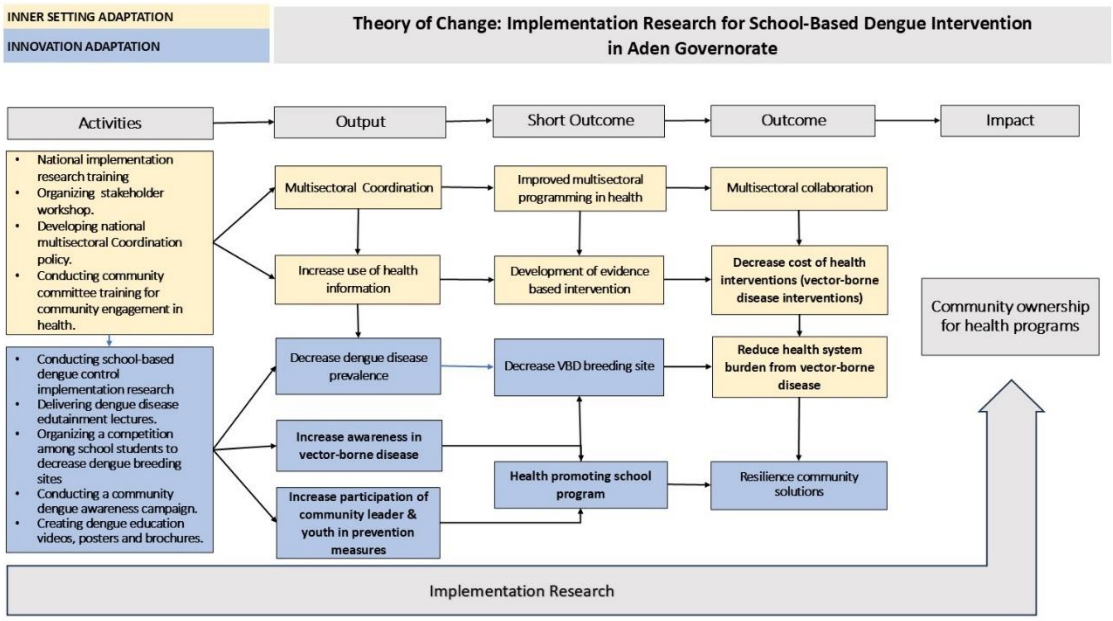
1- Political commitments to assure resources mobilization, aligned with research finding from Somalia and Afghanistan (90,91)
2- Involvement of business owners and community engagement
3- Developing communication and coordination strategy which also mentioned in various international evidence (10,51,92)

Reflecting and evaluating health interventions is fundamental for improvement (93). Research participants suggested field visit and monitoring of epidemiological, along data with tracking project indicators, as part of the monitoring strategy for community engagement interventions(34) Given the sensitivity of conflict context and high corruption rates, strengthening partnership between government and community in the monitoring and evaluation is crucial to transparency ,accountability and health system resilience (52).

For better implementation and adoption of community engagement interventions, research participants suggested necessary modification to the current context (inner setting adaptation) Firstly, creating clear health policy for community engagement and social behaviour change concepts to facilitate community engagement intervention work (86–88)**.** Secondly, encourage community ownership and enhancing community role in health system to understand their needs and sustained outcome(8,92,92).

The adaptation of community engagement interventions (innovation adaptation) suggestions includes the proper utilization of available human and material resources such as school students and religious people and political parties (17,18,29–31).Additionally, improving community communication message by using more innovative and social media methods (85,94,95).

Theory of Change: Implementation Research for School-Based Dengue Intervention in Aden Governorate



Pathway	Barriers	Enablers	Risk	Opportunities	Assumptions
INNER SETTING ADAPTATION	▪ Lack of implementation research expertise. ▪ Conflict and instability . ▪ Weakness governess ▪ Lack of experience in multisectoral work ▪ Lack of funds ▪ Lack of community committee training	▪ Previous international and national experience . ▪ Peace negotiation and decrease war intensity . ▪ Effective communication strategies .	▪ Increase conflict magnitude lead to change priorities from the stakeholders . ▪ Resistance of implementing the new policy ▪ Climate change and increase flood . ▪ Inefficient decision-making	▪ Institutional Capacity Building ▪ Multisectoral engagement ▪ Humanitarian and Development Partnerships ▪ Decrease health system burden ▪ Establish clear roles and responsibilities for multisectoral health programs	▪ Collaboration among stakeholders enhances effectiveness. ▪ Accessible information encourages utilization between different government sectors . ▪ Collaboration improves fast response to prevent outbreaks. ▪ Fostering transition from relief to developmental stage.
INNOVATION ADAPTATION	▪ Lack of students engagement in health prevention . ▪ Passive community engagement. ▪ Infodemic spreading. ▪ Lack of	▪ Diverse perspectives and solutions. ▪ Participatory decision-making ▪ Community driven intervention	▪ Fragmented efforts. ▪ Resistance to change. ▪ Low believe of SBC effectiveness.	▪ Increase NGO focus in community engagement and SBC ▪ Sustainable low cost solution for vector born disease ▪ Increase participation of community leaders and youth . ▪ Decrease cost of illness	▪ Foster an atmosphere of trust. ▪ Encourage community-driven initiatives ▪ Increase community ownership

Figure 4: Theory of Change: Implementation Research for School-Based Dengue Intervention in Aden Governorate.

Chapter 6: Conclusions

The **Innovation domain** suggests that community engagement and SBC interventions are smart, affordable and resilience solution for many health problems in conflict-effected countries. It is essential to determine the best community engagement strategy according on available resources and to consider sustainability from early stages.

The **Outer setting** of Aden Governorate is impacted by the overall political situation, the consequences of conflict are affecting all outer setting constructs. However, the cultural and religious value that emphasize the importance of helping others aligns with community engagement and social behavioural principles, which considered as an important facilitator. Major barrier includes weak institutional work and a heavily reliance on funding agencies.

The **Inner and outer settings** are interrelated, with the conflict variable impacting all constructs which leading to health system fragmentation, corruption and weak institutional work. Facilitating factors include moral incentives, personal recognition, community charity by business owners, and providing the necessary trainings, which could improv the inner and outer settings.

Individuals responsible for community engagement interventions, including policymakers, implementers, and opinion leaders were identified. Participants agreed on the lack of adequate training these individuals and noted a significant difference in motivation levels between implementers and policymakers. Additionally, financial factors were recognized as both motivator when present and demotivator when absent.

For **implementation process**, the team spirit is affected by external pressure and the imposition of certain names. A clear plan and vision for community engagement and SBC interventions are needed, supported by appropriate policies, laws, and capacity building. Main barriers for implementation are the different consequences of conflict and lack of belief in the effectiveness of SBC. Facilitators include global and organization interest in community engagement, cultural value, and both past and present successful experience. Participants recommended an inner setting adaptation strategy focusing on political commitment, business owners support, and clear communication and coordination plan. Additionally, they recommend utilizing available

human resources such as student, religious and community leaders, and political parties, and improve community communication methos as part of innovation adaptation.

6.1 Recommendation:

1- **Early Initiation:** Start community engagement and social behavioral change SBC interventions early as a present and future investment to prevent health issues, and provide a basis for raped outbreak detection and response.

2- **Engagement Approach:** Involve community members in intervention design and planning increase community acceptance and sustainability.

3- **Security Concern:** Should not stop the interventions; instead, strengthen local communities by focusing on individuals who can collaborate with all stakeholders.

4- **Cohesion Focus**: Interventions should promote cohesion between local community and IDPs, and understand the local context to avoid any exacerbate for existing problems.

5- **Policy Enhancement**: Empowering exciting lows and policies to enhance collaboration between government sectors, agencies, and community leaders, thereby building trust, fostering lung-term relationships and efficiently using available resource.

6- **Government-Donor Agreement**: Ensure clear agreement between government and donors for health sustainable health plan is to faster the transition from relief to development stage.

7- **Building Capacity:** Building institutional capacity by providing essential training and guidelines for community and SBC initiatives.

8- **Community Monitoring:** Giving community balanced authority in monitoring, resources allocation, and accountability to increase ownership and minimize corruption.

9- **Community and Religious Leader:** Utilize the influence of community and religious leader to motivate engagement efforts and provide regular recognition.

10- **Political Commitment:** Assuring political commitment and support from the opinion leaders is fundamental part for success.

11- **Monitoring and Evaluation:** Adaptation are essential component for functioning, accountable, and data-driven health programs.

12- **Rebuilding Strategy:** Implement a multifaced rebuilding strategy is mandatory to make required changes.

13- **Creative Communication:** Use creative communication approaches to encourage community engagement

6.2 Research strengths & limitations

To the best of the researcher knowledge, this the first implementation research in Yemen using CFIR framework. The research investigator's experience as a malaria program coordinator for two years was a significant facilitator in developing the research proposal and data collection process, and served ad continues motivator throughout the study.

However, the research faced some limitation in both data collection and data analysis. During data collection, we were unable to meet with the responsible team of Social and Behavioural Change (SBC) program in Aden UNICEF office, despite continuous formal and informal request from February to May 2024. UNICEF is considered as a leading organization of community engagement and SBC in Yemen and was the first to suggested using SBC concept in humanitarian context globally (86) . The data analysis conducted solely by research investigator, with guidance from the internal and external advisors. Time constraints and resources limitation was a significant challenge.

6.3 Future research directions

We think there is a research gap of understanding the perception of the key stakeholders regarding the exact meaning of community engagement and social behavioural change approach. Additionally, further research is needed to explore the degree of political influence on health system in the conflict and post-conflict contexts.

References

1. World Health Organization. Ending the neglect to attain the sustainable development goals: a framework for monitoring and evaluating progress of the road map for neglected tropical diseases 2021–2030 [Internet]. Geneva: World Health Organization; 2021 [cited 2023 Jun 13]. Available from: https://www.who.int/publications-detail-redirect/9789240023680

2. World Health Organization. Global Strategy for dengue prevention and control, 2012–2020 [Internet]. Geneva: World Health Organization; 2012 [cited 2024 Aug 7]. Available from: https://www.who.int/publications/i/item/9789241504034

3. Ministry of Public Health and Population Yemen. Electronic Integrated Disease Early Warning System (EIDEWS) [Internet]. Sana'a: Ministry of Public Health and Population; 2024 Aug. Available from: https://app.powerbi.com/view?r=eyJrIjoiNjEzY2NkNzItY2YxMC00Mjk4LTlmOGItYzgzYmUxMjY2OWRjIiwidCI6IjRhYzMyMjllLTVlMzctNDcyNS1hY2I1LWU2MjhjNjIzNWE5ZiIsImMiOjl9&pageName=ReportSectionaa3efb8cb5fd4cba8386

4. Alghazali KA, Teoh BT, Loong SK, Sam SS, Che-Mat-Seri NAA, Samsudin NI, et al. Dengue Outbreak during Ongoing Civil War, Taiz, Yemen. Emerg Infect Dis. 2019 Jul 1;25(7):1397–400.

5. Barr A, Garrett L, Marten R, Kadandale S. Health sector fragmentation: three examples from Sierra Leone. Glob Health. 2019 Jan 22;15(1):8.

6. Al Waziza R, Sheikh R, Ahmed I, Al-Masbhi G, Dureab F. Analyzing Yemen's health system at the governorate level amid the ongoing conflict: a case of Al Hodeida governorate. Discov Health Syst. 2023;2(1):15.

7. Dureab F, Hussain T, Sheikh R, Al-Dheeb N, Al-Awlaqi S, Jahn A. Forms of Health System Fragmentation During Conflict: The Case of Yemen. Front Public Health. 2021;9:659980.

8. Looming Threat of Dengue Fever: The Africa Context | Open Forum Infectious Diseases | Oxford Academic [Internet]. [cited 2024 Aug 3]. Available from: https://academic.oup.com/ofid/article/11/7/ofae362/7700789

9. Health Sector in Yemen – Policy Note [Internet]. world bank website; 2021. Available from: https://www.worldbank.org/en/country/yemen/publication/health-sector-in-yemen-policy-note

10. Bernal O, Garcia-Betancourt T, León-Giraldo S, Rodríguez LM, González-Uribe C. Impact of the armed conflict in Colombia: consequences in the health system, response and challenges. Confl Health. 2024 Jan 3;18(1):4.

11. Zeng Z, Zhan J, Chen L, Chen H, Cheng S. Global, regional, and national dengue burden from 1990 to 2017: A systematic analysis based on the global burden of disease study 2017. EClinicalMedicine. 2021 Feb;32:100712.

12. Mahmud MAF, Abdul Mutalip MH, Lodz NA, Muhammad EN, Yoep N, Hasim MH, et al. The application of environmental management methods in combating dengue: a systematic review. Int J Environ Health Res. 2023 Nov 2;33(11):1148–67.

13. Packierisamy PR, Ng CW, Dahlui M, Inbaraj J, Balan VK, Halasa YA, et al. Cost of Dengue Vector Control Activities in Malaysia. Am J Trop Med Hyg. 2015 Nov 4;93(5):1020–7.

14. National Center for Emerging and Zoonotic Infectious Diseases (U.S.). One Health Office. Saving lives by taking a one health approach : connecting human, animal, and environmental health [Internet]. 2017. Available from: URL : https://stacks.cdc.gov/view/cdc/49400

15. World Health Organization, Finland. Ministry of Social Affairs and Health. Health in all policies: Helsinki statement. Framework for country action [Internet]. Geneva: World Health Organization; 2014 [cited 2023 Nov 11]. 21 p. Available from: https://iris.who.int/handle/10665/112636

16. TDR Implementation research toolkit, Second edition [Internet]. [cited 2023 Nov 28]. Available from: https://adphealth.org/irtoolkit/

17. Díaz-González EE, Danis-Lozano R, Peñaloza G. Schools as centers for health educational initiatives, health behavior research and risk behavior for dengue infection in school children and community members: a systematic review. Health Educ Res. 2020 Oct 1;35(5):376–95.

18. Durrance-Bagale A, Marzouk M, Tung LS, Agarwal S, Aribou ZM, Ibrahim NBM, et al. Community engagement in health systems interventions and research in conflict-affected countries: a scoping review of approaches. Glob Health Action. 2022 Dec 31;15(1):2074131.

19. World Health Organization. Yemen: WHO Health Emergency Appeal 2024 [Internet]. Geneva: World Health Organization; 2024 [cited 2024 Aug 7]. Available from: https://www.who.int/publications/m/item/yemen-who-2024-health-emergency-appeal

20. HeRAMS Yemen Summary Update Report February 2024 [Internet]. [cited 2024 Aug 7]. Available from: https://www.who.int/publications/m/item/herams-yemen-summary-update-report-2024-02

21. Alsabri M, Alsakkaf LM, Alhadheri A, Cole J, Burkle FM. Chronic Health Crises and Emergency Medicine in War-torn Yemen, Exacerbated by the COVID-19 Pandemic. West J Emerg Med. 2022 Mar;23(2):276–84.

22. United Nations in Yemen. Yemen Humanitarian Needs Overview 2024 [Internet]. Sana'a: United Nations; 2024 Jan [cited 2024 Jul 29]. Available from: https://yemen.un.org/en/259542-yemen-humanitarian-needs-overview-2024-january-2024

23. ReliefWeb. Yemen - Complex Emergency Fact Sheet #5, Fiscal Year (FY) 2024 [Internet]. [cited 2024 Aug 8]. Available from: https://reliefweb.int/report/yemen/yemen-complex-emergency-fact-sheet-5-fiscal-year-fy-2

24. Alsabri M, Alhadheri A, Alsakkaf LM, Cole J. Conflict and COVID-19 in Yemen: beyond the humanitarian crisis. Glob Health. 2021 Jul 22;17:83.

25. Alyousefi TAA, Abdul-Ghani R, Mahdy MAK, Al-Eryani SMA, Al-Mekhlafi AM, Raja YA, et al. A household-based survey of knowledge, attitudes and practices towards dengue fever among local urban communities in Taiz Governorate, Yemen. BMC Infect Dis. 2016 Oct 7;16(1):543.

26. Saied KG, Al-Taiar A, Altaire A, Alqadsi A, Alariqi EF, Hassaan M. Knowledge, attitude and preventive practices regarding dengue fever in rural areas of Yemen. Int Health. 2015 Nov 1;7(6):420–5.

27. Saghir MA, Ahmed WAM, Dhaiban MMA, Osman ME, Abduljabbar NI. Knowledge, attitude, and practices of the community toward dengue fever in Shabwah Governorate, Yemen: a descriptive study. J Egypt Public Health Assoc. 2022 Dec 5;97:27.

28. Bain LE, Ngwayu Nkfusai C, Nehwu Kiseh P, Badru OA, Anne Omam L, Adeagbo OA, et al. Community-engagement in research in humanitarian settings. Front Public Health [Internet]. 2023 [cited 2023 Nov 10];11. Available from: https://www.frontiersin.org/articles/10.3389/fpubh.2023.1208684

29. Saré D, Pérez D, Somé PA, Kafando Y, Barro A, Ridde V. Community-based dengue control intervention in Ouagadougou: intervention theory and implementation fidelity. Glob Health Res Policy. 2018;3:21.

30. Qirbi N, Ismail SA. Health system functionality in a low-income country in the midst of conflict: the case of Yemen. Health Policy Plan. 2017 Jul 1;32(6):911–22.

31. Aung SH, Phuanukoonnon S, Mon Kyaw AM, Lawpoolsri S, Sriwichai P, Soonthornworasiri N, et al. Effectiveness of dengue training programmes on prevention and control among high school students in the Yangon region, Myanmar. Heliyon. 2023 Jun;9(6):e16759.

32. Naing C, Htet NH, Tung WS, Aung HH, Whittaker MA. Facilitators and barriers to engaging communities in health service research on dengue control in Indo-Pacific region: a systematic review. BMC Public Health. 2023 Oct 5;23:1924.

33. Nguyen-Tien T, Probandari A, Ahmad RA. Barriers to Engaging Communities in a Dengue Vector Control Program: An Implementation Research in an Urban Area in Hanoi City, Vietnam. Am J Trop Med Hyg. 2019 Apr;100(4):964–73.

34. Williams HA, Jones COH, Sleigh AC. Diplomatic and operational adaptations to global health programmes in post-conflict settings: contributions of monitoring and evaluation systems to health sector development and 'nation-building' in South Sudan. Med Confl Surviv [Internet]. 2012 [cited 2024 Jul 25];28(3):182–200. Available from: https://www.tandfonline.com/doi/full/10.1080/13623699.2012.714654?scroll=top&needAccess=true

35. Shafique M, Mukhtar M, Areesantichai C, Perngparn U. Effectiveness of Positive Deviance, an Asset-Based Behavior Change Approach, to Improve Knowledge, Attitudes, and Practices Regarding Dengue in Low-Income Communities (Slums) of Islamabad, Pakistan: A Mixed-Method Study. Insects. 2022 Jan 8;13(1):71.

36. Baxter R, Lawton R. The Positive Deviance Approach [Internet]. Cambridge: Cambridge University Press; 2022 Aug [cited 2024 Jan 8]. Available from: https://www.cambridge.org/core/elements/positive-deviance-approach/506CA2D446210E1FE76740B7F835D87C

37. Brownson RC, Colditz GA, Proctor EK. Dissemination and Implementation Research in Health: Translating Science to Practice. Oxford University Press; 2023. 713 p.

38. Damschroder LJ, Reardon CM, Opra Widerquist MA, Lowery J. Conceptualizing outcomes for use with the Consolidated Framework for Implementation Research (CFIR): the CFIR Outcomes Addendum. Implement Sci IS. 2022 Jan 22;17:7.

39. Damschroder LJ, Reardon CM, Widerquist MAO, Lowery J. The updated Consolidated Framework for Implementation Research based on user feedback. Implement Sci. 2022 Oct 29;17(1):75.

40. Policy Commons. Water availability in Yemen - Literature review of the current and future water resources and management [Internet]. 2021 Oct 1 [cited 2024 Jan 9]. Available from: https://policycommons.net/artifacts/4312004/oct-1-2021/5122394/

41. Oct 1, 2021 - Water availability in Yemen - Literature review of the current and future water resources and | Policy Commons [Internet]. [cited 2024 Jan 9]. Available from: https://policycommons.net/artifacts/4312004/oct-1-2021/5122394/

42. International Organization for Migration. Yemen Displacement Tracking Matrix [Internet]. [cited 2024 Jan 3]. Available from: https://dtm.iom.int/es/yemen?body=&field_report_regional_report=All&title=&page=1

43. International Organization for Migration. Yemen | Displacement Tracking Matrix [Internet]. [cited 2024 Jan 3]. Available from: https://dtm.iom.int/es/yemen?body=&field_report_regional_report=All&title=&page=1

44. Alawad KA, Al-Subhi A, Al saafani M, Alraddadi T. Signatures of Tropical climate modes on the Red Sea and Gulf of Aden Sea Level. Indian J Geo-Mar Sci. 2017 Oct 1;46:2088–96.

45. Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. Adm Policy Ment Health. 2015 Sep;42(5):533–44.

46. Hamilton AB, Finley EP. Qualitative methods in implementation research: An introduction. Psychiatry Res. 2019 Oct;280:112516.

47. Ramanadhan S, Revette AC, Lee RM, Aveling EL. Pragmatic approaches to analyzing qualitative data for implementation science: an introduction. Implement Sci Commun. 2021 Jun 29;2(1):70.

48. World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. JAMA. 2013 Nov 27;310(20):2191–4.

49. Baaees MSO, Naiene JD, Al-Waleedi AA, Bin-Azoon NS, Khan MF, Mahmoud N, et al. Community-based surveillance in internally displaced people's camps and urban settings during a complex emergency in Yemen in 2020. Confl Health. 2021 Jul 1;15(1):1–15.

50. Andersson N, Nava-Aguilera E, Arosteguí J, Morales-Perez A, Suazo-Laguna H, Legorreta-Soberanis J, et al. Evidence based community mobilization for dengue prevention in Nicaragua and Mexico (Camino Verde, the Green Way): cluster randomized controlled trial. BMJ. 2015 Jul 8;351:h3267.

51. Thomas JE, Smith R, Brown A. Implementing community-based health program in conflict settings: documenting experiences from the Central African Republic and South Sudan. BMC Health Serv Res [Internet]. 2023 [cited 2024 Jul 25];23(1):977. Available from: https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-023-09733-9

52. Al-Abdulla O, Ekzayez A, Kallström A, Valderrama C, Alaref M, Kauhanen J. Health system recovery in Northwest Syria–challenges and operationalization. Humanit Soc Sci Commun. 2023 Jul 1;10(1):1–10.

53. Marou V, Vardavas CI, Aslanoglou K, Nikitara K, Plyta Z, Leonardi-Bee J, et al. The impact of conflict on infectious disease: a systematic literature review. Confl Health. 2024 Apr 1;18(1):1–32.

54. Turk E, Durrance-Bagale A, Han E, Bell S, Rajan S, Lota MMM, et al. International experiences with co-production and people centredness offer lessons for covid-19 responses. BMJ. 2021 Feb 16;372:m4752.

55. Elnakib S, Elaraby S, Othman F, BaSaleem H, Abdulghani AlShawafi NA, Saleh Al-Gawfi IA, et al. Providing care under extreme adversity: The impact of the Yemen conflict on the personal and professional lives of health workers. Soc Sci Med. 2021 Mar 1;272:113751.

56. Miller NP, Zunong N, Al-Sorouri TAA, Alqadasi YM, Ashraf S, Siameja C. Implementing integrated community case management during conflict in Yemen. J Glob Health. 2020 Dec;10(2):020601.

57. Al-Aghbari AA, Hassan OEH, Dar Iang M, Jahn A, Horstick O, Dureab F. Exploring the Role of Infodemics in People's Incompliance with Preventive Measures during the COVID-19 in Conflict Settings (Mixed Method Study). Healthc Basel Switz. 2023 Mar 26;11(7):952.

58. Attal B, Dureab F, Abbara A. Yemen: current peace talks must also prioritise health. BMJ. 2023 Jun 5;381:1242.

59. Smith J, Jones L, Brown A. Rebuilding health post-conflict: case studies, reflections, and a revised framework. Health Policy Plan [Internet]. 2019 [cited 2024 Jul 25];34(3):230–42. Available from: https://login.research4life.org/tacsgr1academic_oup_com/heapol/article/34/3/230/5423845

60. Al-Awlaqi S, Dureab F, Tambor M. The National Health Cluster in Yemen: assessing the coordination of health response during humanitarian crises. J Int Humanit Action. 2022;7(1):9.

61. Ekezie W, Adaji EE, Murray RL. Essential healthcare services provided to conflict-affected internally displaced populations in low and middle-income countries: A systematic review. Health Promot Perspect. 2020 Jan 28;10(1):24–37.

62. Wise PH. The Epidemiologic Challenge to the Conduct of Just War: Confronting Indirect Civilian Casualties of War. Daedalus. 2017 Jan 1;146(1):139–54.

63. Desai AN, Ramatowski JW, Marano N, Madoff LC, Lassmann B. Infectious disease outbreaks among forcibly displaced persons: an analysis of ProMED reports 1996-2016. Confl Health. 2020;14:49.

64. Spiegel PB. HIV/AIDS among conflict-affected and displaced populations: dispelling myths and taking action. Disasters. 2004 Sep;28(3):322–39.

65. Arage MW, Kumsa H, Asfaw MS, Kassaw AT, Mebratu E, Tunta A, et al. Assessing the health consequences of northern Ethiopian armed conflict, 2022. J Public Health Policy. 2024 Mar;45(1):43–57.

66. United Nations Office for the Coordination of Humanitarian Affairs (OCHA). Yemen [Internet]. [cited 2024 Aug 3]. Available from: https://www.unocha.org/yemen

67. Abu-Lohom NM, Konishi Y, Mumssen Y, Zabara B, Moore SM. Water Supply in a War Zone [Internet]. Washington, DC: World Bank; 2018 [cited 2024 Aug 3]. Available from: https://hdl.handle.net/10986/30107

68. Munezero E, Manoukian S. The social determinants of health and health seeking behaviour in populations affected by armed conflict: a qualitative systematic review. Med Confl Surviv. 2021 Dec;37(4):293–318.

69. Yemen Humanitarian Update: Issue 1, January-February 2024 [EN/AR] | OCHA [Internet]. [cited 2024 Aug 3]. Available from: https://www.unocha.org/publications/report/yemen/yemen-humanitarian-update-issue-1-january-february-2024-enar

70. Health Research Policy and Systems. Addressing fragility through community-based health programmes: insights from two qualitative case study evaluations in South Sudan and Haiti [Internet]. [cited 2024 Aug 3]. Available from: https://health-policy-systems.biomedcentral.com/articles/10.1186/s12961-019-0420-7

71. AlKarim T, Abbara A, Attal B. Armed conflict alone does not explain the devastation of Yemen's health system. BMJ Glob Health. 2021 Feb;6(2):e004740.

72. Alshakka M, Mohamed Ibrahim MI, Bahattab A, Badulla WFS, Shankar PR. An insight into the pharmaceutical sector in Yemen during conflict: challenges and recommendations. Med Confl Surviv. 2020 Sep;36(3):232–48.

73. Ekzayez A, Al-Khalil M, Jasiem M, Al Saleh R, Alzoubi Z, Meagher K, et al. COVID-19 response in northwest Syria: innovation and community engagement in a complex conflict. J Public Health Oxf Engl. 2020 Aug 18;42(3):504–9.

74. Ager A, Salehyan I, Burnham G, Mayhew S, Wilkinson O, Wurie H, et al. Health service resilience in Yobe state, Nigeria in the context of the Boko Haram insurgency: a systems dynamics analysis using group model building. Confl Health [Internet]. 2015 [cited 2024 Aug 4];9:13. Available from: https://conflictandhealth.biomedcentral.com/articles/10.1186/s13031-015-0056-3

75. Jones SG, Center for Domestic and International Health Security, editors. Securing health: lessons from nation-building missions. Santa Monica, CA: RAND Center for Domestic and International Security; 2006. 351 p.

76. Newbrander W, Waldman R, Shepherd-Banigan M. Rebuilding and strengthening health systems and providing basic health services in fragile states. Disasters. 2011 Oct;35(4):639–60.

77. Garber K, Fox C, Abdalla M, Tatem A, Qirbi N, Lloyd-Braff L, et al. Estimating access to health care in Yemen, a complex humanitarian emergency setting: a descriptive applied geospatial analysis. Lancet Glob Health. 2020 Nov;8(11):e1435–43.

78. Turk E, Durrance-Bagale A, Han E, Bell S, Rajan S, Lota MMM, et al. International experiences with co-production and people centredness offer lessons for covid-19 responses. BMJ. 2021 Feb 15;372:m4752.

79. Meessen B, Soucat A, Sekabaraga C. Performance-based financing: just a donor fad or a catalyst towards comprehensive health-care reform? Bull World Health Organ. 2011 Feb 1;89(2):153–6.

80. Sutherland K, Christianson JB, Leatherman S. Impact of targeted financial incentives on personal health behavior: a review of the literature. Med Care Res Rev MCRR. 2008 Dec;65(6 Suppl):36S-78S.

81. Dureab FA. The impact of conflict on the health situation in Yemen 2015. J Emerg Med Trauma Acute Care. 2016 Oct 9;2016(2-International Conference in Emergency Medicine and Public Health-Qatar Proceedings):31.

82. Standley CJ, Jumaan AO, Sorrell EM, El Bcheraoui C. Editorial: Humanitarian Health in Conflict and Violence Settings. Front Public Health. 2022;10:946090.

83. Saudi Embassy. Riyadh Agreement Fact sheet [Internet]. [cited 2024 Aug 5]. Available from: https://www.saudiembassy.net/sites/default/files/Riyadh%20Agreement%20Fact%20sheet.pdf

84. Center S. Sana'a Center For Strategic Studies. 2020 [cited 2024 Aug 5]. The Riyadh Agreement One Year On. Available from: https://sanaacenter.org/publications/analysis/11905

85. Orach CG, Otim G, Aporomon JF, Amone R, Okello SA, Odongkara B, et al. Perceptions, attitude and use of family planning services in post conflict Gulu district, northern Uganda. Confl Health. 2015 Aug 11;9(1):24.

86. Humanitarian UNICEF [Internet]. [cited 2024 Aug 6]. Community Engagement in Humanitarian Action (CHAT) Toolkit: Updated version. Available from: https://www.corecommitments.unicef.org/kp/community-engagement-in-humanitarian-action-(chat)-toolkit%3A-updated-version

87. Parker E, Maynard V, Gordon M. Community Engagement in Humanitarian and Development Action: Barriers, Enablers and Good Practice. 2023.

88. Agile Purpose: Overcoming Bureaucracy | SpringerLink [Internet]. [cited 2024 Aug 6]. Available from: https://link.springer.com/chapter/10.1007/978-3-030-17674-7_6

89. Akik C, Semaan A, Shaker-Berbari L, Jamaluddine Z, Saad GE, Lopes K, et al. Responding to health needs of women, children and adolescents within Syria during conflict: intervention coverage, challenges and adaptations. Confl Health. 2020 May 29;14(1):37.

90. Gele AA, Bjune GA. Armed conflicts have an impact on the spread of tuberculosis: the case of the Somali Regional State of Ethiopia. Confl Health. 2010 Jan 28;4(1):1.

91. Norris A, Hachey K, Curtis A, Bourdeaux M. Crippling Violence: Conflict and Incident Polio in Afghanistan. PLoS ONE. 2016 Mar 9;11(3):e0149074.

92. Post-conflict health reconstruction: search for a policy [Internet]. [cited 2024 Jul 25]. Available from: https://login.research4life.org/tacsgr1onlinelibrary_wiley_com/doi/epdf/10.1111/j.1467-7717.2011.01237.x

93. Dy SM, Ashok M, Wines RC, Rojas Smith L. A framework to guide implementation research for care transitions interventions. J Healthc Qual Off Publ Natl Assoc Healthc Qual. 2015;37(1):41–54.

94. Adewemimo AW, Msuya SE, Olaniyan CT, Adegoke AA. Utilisation of skilled birth attendance in Northern Nigeria: a cross-sectional survey. Midwifery. 2014 Jan;30(1):e7–13.

95. Wilunda C, Scanagatta C, Putoto G, Montalbetti F, Segafredo G, Takahashi R, et al. Barriers to utilisation of antenatal care services in South Sudan: a qualitative study in Rumbek North County. Reprod Health. 2017 May 22;14(1):65.

Annexures

ANNEX 1 -In-Depth Interviews Guide

In-depth Interviews Guide for Data Collection form (Decision Maker, Ministry of health employee, Organizations employees) to investigate Barriers and Facilitators of Community Engagement in Dengue Interventions in Conflict- affected Aden, Yemen

1- Innovation Domain

A. What information do you have about community participation intervention in dengue fever prevention in Aden?

B. How do you compare community participation intervention in dengue fever prevention to other existing interventions targeting dengue fever in Aden?

C. What modifications do you see as necessary for the community participation intervention to ensure its effectiveness in Aden? How can they be implemented?

D. In your opinion, how complex or difficult is the community participation intervention for dengue fever prevention?

E. What factors and costs should be considered when deciding to implement the community participation intervention in dengue fever control in Aden?

2- Outer Setting Domain

A. Are there any major or unexpected events that have occurred or may occur in Aden Governorate that could disrupt the implementation of community participation programs in dengue fever prevention?

B. In your opinion, what are the community's impressions or responses in Aden Governorate to the implementation of community participation interventions in dengue fever prevention? What is their impact on the intervention?

C. Are there any current economic, environmental, or political conditions in Aden Governorate that may encourage or hinder the implementation of community participation programs in dengue fever prevention?

D. To what extent is there communication between your organization and various stakeholders in Aden Governorate that support the implementation of community participation programs in dengue fever prevention?

E. Are you aware of any legislation or regulatory policies that encourage or hinder the implementation of community participation programs in dengue fever prevention? What are your recommendations in this regard?

F. Are there any available funding opportunities that support the implementation of community participation interventions in dengue fever prevention in Aden? How can they be accessed?

G. Are there any external pressures that drive or disrupt the implementation of community participation programs in dengue fever prevention in Aden Governorate?

3- Inner Setting Domain

A. How would you describe the distribution of tasks and responsibilities among the staff in community participation programs in dengue fever prevention, and what is its impact on the implementation of the intervention?

B. How do you describe the relationship between you and your colleagues at work, regardless of their job position? Do you believe there is a spirit of teamwork?

C. How do you describe the formal and informal communication mechanisms for exchanging information between you and your colleagues during the implementation of community participation and dengue fever prevention interventions in Aden Governorate?

D. How do you think the organizational culture (general beliefs, values, assumptions adopted by people) affects the implementation of community participation programs in dengue fever prevention in Aden Governorate?

E. According to the organization's work mechanisms and in comparison with other initiatives or interventions, how important do you think it is to implement community participation programs in dengue fever prevention in Aden Governorate?

F. In your opinion, what are the material or moral incentives that can be provided to improve the implementation of community participation interventions in dengue fever prevention in Aden?

G. What resources are available in Aden Governorate that can contribute to the implementation of community participation programs in dengue fever prevention in Aden Governorate?

H. Are there any training or guidance booklets that enhance knowledge of community participation implementation methods in dengue fever prevention?

4- Individuals Domain

A. Who are the decision-makers for adopting community participation interventions in dengue fever prevention in Aden Governorate? What is their current job position?

- To what extent do you believe community participation interventions in dengue fever prevention in Aden Governorate serve their work interests?

- What level of skills or capabilities do they possess that you believe are necessary for the successful implementation of community participation interventions in dengue fever prevention in Aden Governorate?

- To what extent do you think they are motivated to actively participate in implementing community participation programs and dengue fever prevention in Aden Governorate?

B. Who are responsible for implementing the decisions of community participation interventions in dengue fever prevention in Aden Governorate? What is their current job position?

- To what extent do you believe community participation interventions in dengue fever prevention in Aden Governorate serve their work interests?

- What level of skills or capabilities do they possess that you believe are necessary for the successful implementation of community participation interventions in dengue fever prevention in Aden Governorate?

- To what extent do you think they are motivated to actively participate in implementing community participation programs and dengue fever prevention in Aden Governorate?

C. Who are the influencers on both decision-makers and implementers of community participation interventions in dengue fever prevention in Aden Governorate? What is their current job position?

- To what extent do you think they are motivated to actively participate in implementing community participation programs and dengue fever prevention in Aden Governorate?

5- Process of Implementation Domain

A. To what extent is there coordination and cooperation among individuals in implementing community participation programs in dengue fever prevention in Aden Governorate?

B. In your opinion, what are the priorities and requirements for implementing community participation programs in dengue fever prevention in Aden Governorate for both intervention implementers and target communities?

C. In your opinion, what are the barriers and facilitators to implementing community participation interventions in dengue fever prevention in Aden Governorate?

D. Are you aware of a clear, goal-oriented, and time-bound plan with responsibilities specified for implementing community participation interventions in dengue fever prevention in Aden Governorate?

E. In your opinion, what strategies will contribute to reducing barriers and promoting facilitators for community participation interventions in dengue fever prevention by eliminating mosquito breeding sites in Aden Governorate?

F. What are the appropriate evaluation and monitoring methods for community participation interventions in dengue fever prevention in Aden Governorate?

G. What is the suitable mechanism to ensure the sustainability of community participation interventions in dengue fever prevention by eliminating mosquito breeding sites in Aden Governorate?

- Do you have any additional comments you would like to add?

- Are there any individuals you recommend interviewing?

ANNEX 2 -Focus Group Discussion Interview Guide

Focus Group Interview Guide for Data Collection form (community committee members) to investigate Barriers and Facilitators of Community Engagement in Dengue Interventions in Conflict- affected Aden, Yemen

1- Innovation Domain

A. What information do you have about community participation intervention in dengue fever prevention in Aden?

B. What modifications do you see as necessary for the community participation intervention to ensure its effectiveness in Aden? How can they be implemented?

C. In your opinion, how complex or difficult is the community participation intervention for dengue fever prevention?

2- Outer Setting Domain

A. Are there any major or unexpected events that have occurred or may occur in Aden Governorate that could disrupt the implementation of community participation programs in dengue fever prevention?

B. Are there any current economic, environmental, or political conditions in Aden Governorate that may encourage or hinder the implementation of community participation programs in dengue fever prevention?

C. To what extent is there communication between your organization and various stakeholders in Aden Governorate that support the implementation of community participation programs in dengue fever prevention?

3- Inner Setting Domain

A. In your opinion, what are the material or moral incentives that can be provided to improve the implementation of community participation interventions in dengue fever prevention in Aden?

B. What resources are available in Aden Governorate that can contribute to the implementation of community participation programs in dengue fever prevention in Aden Governorate?

C. Are there any training or guidance booklets that enhance knowledge of community participation implementation methods in dengue fever prevention?

4- Individuals Domain

A. Who are the decision-makers for adopting community participation interventions in dengue fever prevention in Aden Governorate? What is their current job position?

- What level of skills or capabilities do they possess that you believe are necessary for the successful implementation of community participation interventions in dengue fever prevention in Aden Governorate?

- To what extent do you think they are motivated to actively participate in implementing community participation programs and dengue fever prevention in Aden Governorate?

B. Who are responsible for implementing the decisions of community participation interventions in dengue fever prevention in Aden Governorate? What is their current job position?

- What level of skills or capabilities do they possess that you believe are necessary for the successful implementation of community participation interventions in dengue fever prevention in Aden Governorate?

- To what extent do you think they are motivated to actively participate in implementing community participation programs and dengue fever prevention in Aden Governorate?

C. Who are the influencers on both decision-makers and implementers of community participation interventions in dengue fever prevention in Aden Governorate? What is their current job position?

5- Process of Implementation Domain

A. To what extent is there coordination and cooperation among individuals in implementing community participation programs in dengue fever prevention in Aden Governorate?

B. In your opinion, what are the barriers and facilitators to implementing community participation interventions in dengue fever prevention in Aden Governorate?

C. What is the suitable mechanism to ensure the sustainability of community participation interventions in dengue fever prevention by eliminating mosquito breeding sites in Aden Governorate?

- Do you have any additional comments you would like to add?

- Are there any individuals you recommend interviewing?

ANNEX 3 - CONSENT FORM

I, ...

Agree / Do not agree to participate in this research titled:

BARRIERS AND FACILITATORS OF COMMUNITY ENGAGEMENT IN DENGUE INTERVENTIONS IN CONFLICT- AFFECTED AREA ADEN, YEMEN: AN IMPLEMENTATION RESEARCH

1. I understand the contents of the study based on "Information to the Respondents" attached.
2. I understand that all information given and all individual results are confidential and will be used for research purpose and for researcher's reference only.
3. I also understand that all information obtained may be used for publication but all personal details will not be disclosed.
4. I understand that this research is conducted to assess the factors that facilitate or hinder the implementation of community engagement programs for dengue prevention and control in Aden Governorate.
5. I understand that I have the right to withdraw my participation and permission at any time needed, whenever I feel uncomfortable with the interview and no penalties could be placed on me.

…….	…….
(Respondent signature)	(Researcher signature)
Name:	Name:
Date:	Date:

بسم الله الرحمن الرحيم

Republic of Yemen

University of Aden

Faculty of Medicine and Health Sciences

الجمهورية اليمنية

جامعة عدن

كلية الطب والعلوم الصحية

Date: 22nd January 2024

Research and Ethics Committee

To: Dr. Mustafa Moahmmed Dhaiban,

Dear Dr. Mustafa,

We are pleased to inform you that the Research and Ethics Committee had granted you the approval to carry out the research project:

Research Title: "Barriers and Facilitators of Community Engagement in Dengue Interventions in Conflict-Affected Areas in Aden, Yemen: An Implementation Research"

Research Code: REC-181-2024.

With reference to the above, the Research and Ethics Committee have approved the research proposal and found it in compliance with the International Conference of Harmonization (ICH) – Good Clinical Practice Guidelines. Please submit your Final Report upon completion of the research to the Research and Ethics Committee Secretariat.

Sincerely yours,

Prof. Dr. Iman Ali Ba-Saddik, PhD
Vice Dean for Postgraduate Studies and Scientific Research
Faculty of Medicine and Health Sciences
University of Aden, Yemen
Phone: 00967 2 231767/ 232997
Mobile: 00967 7777232997
Email: iman.ali.med@aden-univ.net
imanmakki@gmail.com