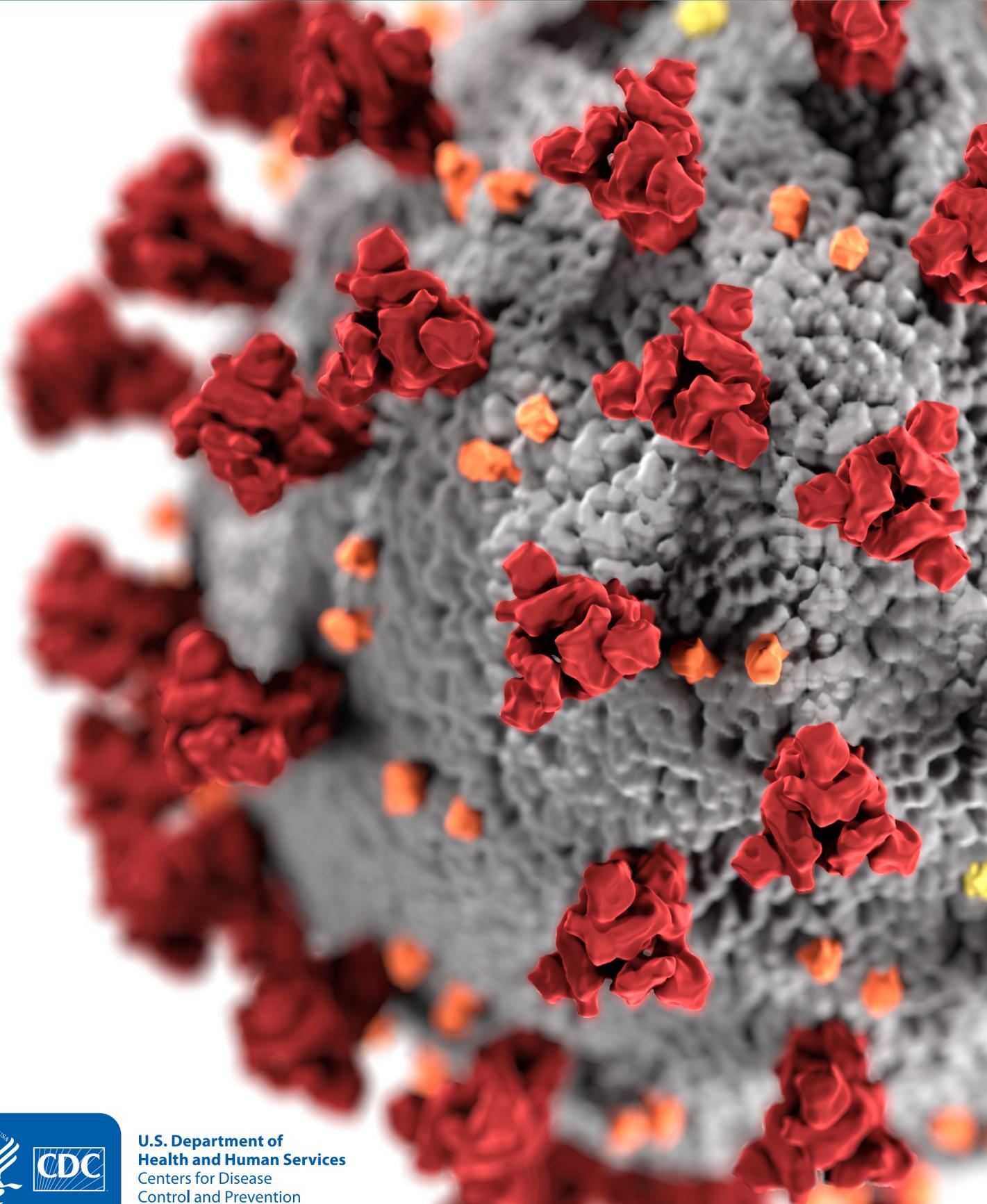


# POPULATION CONNECTIVITY ACROSS BORDERS (POPCAB) TOOLKIT

## COVID-19 Preparedness and Response



**U.S. Department of  
Health and Human Services**  
Centers for Disease  
Control and Prevention

# Population Connectivity Across Borders (PopCAB) Toolkit

A toolkit to characterize population movement patterns to inform public health programming

## Summary

The Population Connectivity across Borders (PopCAB) toolkit is a toolkit for gathering and analyzing information about population mobility to inform public health interventions. It determines the types of travelers moving through an area, the routes taken, and the reasons for travel. Understanding these patterns of movement can help inform preparedness and response strategies for communicable diseases, including COVID-19.

## Background

Global mobility and cross-border movement have contributed to continued spread of COVID-19 worldwide. Border closures, movement restrictions, and other COVID-19 mitigation policies have altered where people are moving and how they are getting there. Characterizing these patterns of movement is crucial to informing tailored public health interventions. Public health officials can implement CDC's PopCAB toolkit to visualize population movement patterns and identify areas where officials can strengthen tailored interventions to prevent, detect, and respond to the spread of communicable diseases. For example, the information can guide how to allocate resources for COVID-19 response, including prioritizing points of entry (POE) with high connectivity to outbreak areas. The information can also contribute to preparing multisectoral partners for the reopening of borders to international travel.

## Goal

The overall goal of implementing PopCAB is to gather, analyze, and apply information about population mobility to inform public health interventions.

## Approach

PopCAB consists of focus group discussions (FGD) and key informant interviews (KII), each with a participatory mapping component. Public health practitioners implement the PopCAB toolkit to facilitate activities with key stakeholders at the national, subnational, and community levels. They conduct these activities in areas of interest that are close to an outbreak zone, border crossing points, large gathering points, or heavily trafficked transportation routes. The team can complete data collection and analysis within a matter of days to support outbreak response, or over extended periods for longitudinal analyses.

The PopCAB process incorporates a tiered data collection approach that employs qualitative and quantitative methods and builds on existing information (Annex 1, Annex 2). The implementation team adapts the PopCAB toolkit contents and template question guide to the specific project objectives (Annex 3). Based on these PopCAB objectives, the team can engage with representatives from many sectors, including economic, health, transportation, etc.

## Impact

Public health practitioners can use the information and spatial data gathered through PopCAB activities to visualize population movement patterns and identify areas where officials can strengthen their tailored interventions to prevent, detect, and respond to the spread of a communicable disease such as COVID-19 (Annex 4).

### PopCAB Toolkit Contents

- Trainings modules
- Job aids
- FGD and KII template guides
- Orientation scripts
- Participant sign-in sheet
- Example spatial database
- Example annotated map

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## PopCAB Adaptations for COVID-19

Public health leadership can adapt PopCAB methods to inform COVID-19 mitigation strategies.

### *Mitigation measures to decrease risk of disease transmission during field activities*

The implementation team can modify field activities by enforcing social distancing and mask wearing during focus group discussions, participatory mapping exercises, and other community engagement activities. If possible, the team can conduct PopCAB activities outdoors or in indoor spaces with good ventilation. Alternatively, if capacity and resources are available for remote sessions, FGD and KII with participatory mapping may be conducted virtually.

### *Key considerations for designing PopCAB implementation*

The implementation team can tailor the PopCAB toolkit to collect information about the movement patterns and behaviors of specific populations of interest where COVID-19 risk of transmission is elevated. Public health leadership should consider implementing PopCAB in areas where the risk of transmission or proximity to a COVID-19 outbreak is high. Other areas of interest for PopCAB implementation include border areas with official or unofficial crossing points, heavily trafficked transportation routes or busy markets. By asking prioritized populations a wide array of questions about their mobility, the implementation team can help to not only inform public health decisions, but also to evaluate changes in movement and connectivity patterns after COVID-19 response policies have been put into effect.

### *An example for tailoring PopCAB implementation to address COVID-19 response*

Long-distance truck drivers have been identified as a population of interest for some African countries because these drivers typically cross several international borders along their routes. The truck drivers pose a risk for both international and domestic transmission of COVID-19 and can offer valuable information during PopCAB activities about transmission hotspots. Focus group discussions with truck drivers may generate discussions about the routes they take, where they stop, how long they stay at the stops, amount of interaction with the local community at each stop, where they go for emergency medical care during their routes, how their mobility has changed due to COVID-19 restrictions, and places along their routes where they are required to undergo screening for COVID-19.

The results gathered through PopCAB activities with truck drivers can be used to develop tailored risk communication campaigns at key truck stops in order to educate drivers about possible symptoms, testing requirements at POE, and the risk of COVID-19 transmission.

#### **Example PopCAB Objectives to Address COVID-19**

- Describe COVID-19 healthcare-seeking behavior
- Map the connectivity of towns near a COVID-19 outbreak
- Identify best placement for health screening checkpoints
- Describe resource availability at points of interest
- Map transportation routes after border closures
- Identify points of interest for increased COVID-19 risk communication
- Identify high-risk communities for strengthening community-based surveillance
- Characterize seasonality of movement
- Identify priority POE for COVID-19 surveillance

#### **Example Stakeholder Groups to Engage**

- Healthcare workers
- Traditional healers
- Transportation workers
- Marketplace vendors
- Religious leaders
- Tourists

# Annex 1

## Data Sources for Migration and Movement

To further understand population movement in a specific area, additional mobility data sources can be used in tandem with PopCAB data. By combining multiple mobility data sources in an analysis, a country or region can achieve a more well-rounded understanding of connectivity patterns within and across its borders. The data sources listed in the table below provide a diverse set of information about population mobility patterns worldwide.

**Table: Data Sources for Migration and Movement**

Dataset	Description
<a href="#">Aerial and satellite imagery</a>	Aerial and satellite imagery
<a href="#">Armed Conflict Location and Event Data (ACLED)</a>	Dates, actors, locations, fatalities, and modalities of all reported global political violence and protest events
<a href="#">COVID Mobility Network</a>	Repositories, tools, guidance for using aggregated mobility data to support the COVID-19 response
<a href="#">Daily satellite imagery</a>	Satellite imagery
<a href="#">Facebook Data for Good</a>	Population density; electrical distribution grid maps; internet access
<a href="#">Facebook Disaster Maps</a>	Aggregate usage patterns of social media apps after a natural disaster
<a href="#">FAO Gridded Livestock Data</a>	Rasters (gridded matrix data) of global spatial distribution of cattle and other animals
<a href="#">Flowminder</a>	Resources and tools for using cell phone data to support decision making
<a href="#">Global Internal Displacement Database</a>	A tool for exploring and visualizing disaster-related displacement risk metrics and for assessing the likelihood of the occurrence of specific displacement events
<a href="#">Global Rural-Urban Mapping Project</a>	Identifies urban areas worldwide
<a href="#">Google Mobility</a>	Mobility reports and data for various countries
<a href="#">GRID 3 - Critical Core</a>	Set of spatial data compiled for COVID-19 response in Africa; includes data on population, settlements, points of interest, and boundaries
<a href="#">GRID 3 - Settlement boundaries</a>	Settlement extents for select countries in Africa
<a href="#">IOM Displacement Tracking Matrix</a>	Data on mobility, vulnerability, and needs of displaced and mobile populations
<a href="#">Uppsala Conflict Data Program</a>	Organized violence data and oldest ongoing data collection project for civil war
<a href="#">WHO COVID dashboard</a>	Up-to-date COVID-19 case data for download
<a href="#">WorldPop</a>	Internal migration flows for selected countries

### Additional Reading Materials

Harvey B, Dalal W, Amin F, McIntyre E, Ward S, Merrill RD, Mohamed A, Hsu C (2020). [Planning and implementing a targeted polio vaccination campaign for Somali mobile populations in Northeastern Kenya based on migration and settlement patterns](#), *Ethnicity & Health*, DOI: 10.1080/13557858.2020.1838455

Kakaï CG, Okunromade O, Dan-Nwafor C, Chabi A, Martial G, Dalhat M, Ward S, Tante O, Nguku P, Hamadi A, Ilori E, Lokossou V, Brito C, Ojo O, Kone I, Agbeko T, Ihekweazu C, Merrill RD (2020) [Improving Cross-Border Preparedness and Response: Lessons Learned from 3 Lassa Fever Outbreaks Across Benin, Nigeria, and Togo, 2017-2019](#). *Health Secur*;18, S1;S105-S112

Merrill RD, Chabi AIB, McIntyre E, Kouassi J, Alleby M, Codja C, Tante O, Godjedo P, Kone I, Ward S, Agbeko T, Kakaï C (2021). [An approach to integrate population mobility patterns and sociocultural factors in communicable disease preparedness and response](#). *Humanit Soc Sci Commun*. 8, 23 <https://doi.org/10.1057/s41599-020-00704-7>

Merrill RD, Rogers K, Ward S, Ojo O, Kakaï CG, Agbeko TT, Garba H, MacGurn A, Oppert M, Kone I, Bamsa O, Schneider D, Brown C. (2017) [Responding to communicable diseases in internationally mobile populations at points of entry and along porous borders, Nigeria, Benin, Togo](#). *Emerg Infect Dis*; Supp 23;13:2250-56.

Nakiire L, Mwanja H, Pillai S, Gasanani J, Ntungire D, Nsabiyumva S, Mafigiri R, Muneza N, Ward S, Daffe Z, Ahabwe P, Kyazze S, Ojwang J, Homsy J, McIntyre E, Lamorde M, Walwema R, Makumbi I, Muruta A, Merrill RD (2020) [Population Movement Patterns Among the Democratic Republic of the Congo, Rwanda, and Uganda During an Outbreak of Ebola Virus Disease: Results from Community Engagement in Two Districts — Uganda, March 2019](#). *MMWR Morb Mortal Wkly Rep*;2020 Jan 10;69(1):10-13

Nanziri C, Ario A, Ntono V, Nsereko G, Monje F, Aliddeki D, Bainomugisha K, Bulage L, Kadobera D, Kyazze S, Kayiwa J, Tusiime P, Mabumba E, Makumbi I, Nakiire L, Walwema R, Lomarde M, Ocom F, Kasule J, Ward S, Merrill RD. [Ebola Virus Disease Preparedness Assessment and Risk Mapping in Uganda, August - September 2018](#). *Health Secur Mar/Apr 2020*;18(2):105-113. doi: 10.1089/hs.2019.0118.

# Annex 3

## Discussion Guide Template

The discussion guide template provides adaptable questions to facilitate the collection of qualitative information and inform more targeted public health interventions. This list of questions will aid stakeholders in identifying points, routes and populations of interest to discuss in subsequent questions. These questions can be tailored to any stakeholder group and country's objective in characterizing population movement.

**Table: Discussion Guide Template**

Theme	Template Questions to Participants
<b>Broad Context</b>	<ul style="list-style-type: none"> <li>• Please identify and describe, using the map, places you visit in this general area (for example, towns, health facilities, markets, places of worship, schools, specific routes)?</li> <li>• When you travel outside the country, where do you go? Why?</li> </ul>
<b>Community Connectivity</b>	<ul style="list-style-type: none"> <li>• Using the map, please describe local, regional, and international movement patterns. Discuss briefly who, why, to/from, when, how, and how many people are moving in, around, and beyond the area of interest.</li> <li>• Do people from outside your community visit your community? If yes, where do they visit in your community and why?</li> <li>• Where do people from your community travel to outside your community? Why?</li> <li>• Which of these identified areas of interest do you feel are also important for others in [<i>insert stakeholder group: e.g. your profession, your tribe, your community</i>]? Why are these areas more important?</li> </ul>
<b>Who: Characteristics of Mobile Population</b>	<ul style="list-style-type: none"> <li>• Who visits this area of interest? Please discuss their characteristics (for example, age, profession, cultural identity, residential area including areas in bordering countries, etc.).</li> <li>• Do new people come often or do the same people routinely visit?</li> <li>• Do the same groups (nationalities, or ethnic/cultural/linguistic groups) come throughout the year or do different groups tend to come different times of the year?</li> </ul>
<b>Why: Reasons for Population Movement</b>	<ul style="list-style-type: none"> <li>• Why do people visit this area of interest (for example, seeking healthcare, selling or buying goods, religious reasons, professional opportunities, education, family connections)?</li> <li>• Is travel to this area of interest easier than to other areas with similar services?</li> </ul>
<b>How: Mode of Transportation</b>	<ul style="list-style-type: none"> <li>• What type of transportation do people take to reach this area of interest (for example, train, car, bus, boat, ride share, bicycle, by foot)?</li> <li>• Is this mode of transportation available throughout the year or only during specific seasons or holidays?</li> </ul>
<b>When: Seasonality or Duration of Movement</b>	<ul style="list-style-type: none"> <li>• How long do people stay when they visit this area of interest (for example, a few hours, a day, a few days, months)?</li> <li>• Where do they stay overnight if they come from another community (for example, hotels, residential areas, non-permanent structures, etc.)?</li> <li>• Describe the daily, weekly, seasonal patterns for visiting or traveling through this area of interest.</li> </ul>
<b>Where: Border Crossing</b>	<ul style="list-style-type: none"> <li>• Where do people routinely cross the border (official and unofficial POE)?</li> <li>• Why do they choose that specific crossing point?</li> <li>• Where along this border crossing route do people stop and why do they stop there (for example, truck stops/weigh stations, for food, to spend the night, visit family/friends)?</li> <li>• If a border crosser becomes sick along their journey, where would they go to seek treatment (for example, return home, traditional healer, market to buy medication, healthcare facility)</li> </ul>

## Annex 3

Theme	Template Questions to Participants
<b>COVID-19 Specific Questions</b>	<ul style="list-style-type: none"> <li>• How have patterns of mobility changed with the COVID-19 pandemic?</li> <li>• Has the average wait time at the nearest POE changed during COVID-19? If so, how?</li> <li>• Where in this area of interest are people required to undergo screening (for example, temperature screening, COVID-19 testing, proof of vaccination, etc.)?</li> <li>• Where would you go for medical care if you started to feel sick while traveling?</li> <li>• How do mobile populations seek out COVID-19 information and in what language do they prefer (for example, WhatsApp groups (faith-based, family chats), Facebook groups, radio, tv, posters, etc.)?</li> <li>• What are the biggest challenges to accessing COVID-19 information, health care, testing, and vaccination in your community?</li> <li>• What is the perception regarding COVID-19 in your community?</li> <li>• How much interaction do travelers have with your local community? Why?</li> <li>• Please identify additional geographic areas you feel are of public health interest based on population movement patterns. Describe why these areas are important.</li> </ul>

# Annex 4

## PopCAB Package Implementation Matrix

This matrix helps a PopCAB implementation team determine the level of activities and resources needed to achieve the desired outputs that would best inform their objectives. The first tier would be useful for countries that need to quickly collect and summarize mobility data to respond to a COVID-19 outbreak. Teams that have previously conducted PopCAB or that have more time and resources to dedicate to PopCAB activities can consider adding-on components such as digitizing spatial data garnered from map annotations and identifying common themes in the data through qualitative analysis. The implementation team can tailor these PopCAB add-ons to inform different COVID-19 response efforts by targeting populations or areas of interest that are at high risk of COVID-19 transmission.

**Table: PopCAB Package Implementation Matrix**

PopCAB Plan/Package	Activities	Product Options
<b>Essentials</b>	<ul style="list-style-type: none"> <li>• Training</li> <li>• Field activities                             <ul style="list-style-type: none"> <li>» Focus Group Discussion (FGD)</li> <li>» Map Annotation</li> </ul> </li> <li>• Transcribe FGD notes</li> <li>• Complete summary table</li> <li>• Create PopCAB database</li> </ul>	<ul style="list-style-type: none"> <li>• Annotated paper maps</li> <li>• Tables of Points of Interest (POI)</li> <li>• Typed summary reports and PowerPoint presentations</li> </ul>
<b>Optional add-on: Digitizing Spatial Data</b>	<ul style="list-style-type: none"> <li>• Digitize spatial data                             <ul style="list-style-type: none"> <li>» Coordinates of locations</li> <li>» Routes described</li> </ul> </li> <li>• Harmonize spatial data, when working with multiple FGDs</li> </ul>	<ul style="list-style-type: none"> <li>• Maps of points of interest across FGDs/activities</li> <li>• Maps of points of interest and routes across FGDs/activities</li> </ul>
<b>Optional add-on: Synthesized Spatial and Qualitative Analysis</b>	<ul style="list-style-type: none"> <li>• Basic qualitative analysis                             <ul style="list-style-type: none"> <li>» Read FGDs and roughly identify themes (topics that come up frequently or are indicated as areas of interest)</li> </ul> </li> <li>• Query spatial data according to qualitative themes</li> </ul>	<ul style="list-style-type: none"> <li>• Narrative and thematic maps which include synthesized POI/routes from multiple activities</li> </ul>
<b>Optional add-on: Full Qualitative Analysis</b>	<ul style="list-style-type: none"> <li>• Follow guidelines for rigorous thematic analysis                             <ul style="list-style-type: none"> <li>» Create code book</li> <li>» Code</li> <li>» Search for and define themes</li> </ul> </li> <li>• Write thematic report</li> </ul>	<ul style="list-style-type: none"> <li>• Report on thematic analysis from the FGD data</li> <li>• Narrative and thematic maps based on more robust qualitative analysis</li> </ul>



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