

TAILORING HEALTH DELIVERY IN HARD-TO-REACH POPULATIONS FOR NTDs

FINAL PRESENTATION

Jacinta Ifunanya Azie, Sarah Hicks, Ana Krause, Carol Levin

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START
CENTER

STRATEGIC ANALYSIS,
RESEARCH & TRAINING CENTER
Department of Global Health | University of Washington

PROJECT TEAM



Jacinta Ifunanya Azie
MPH Student, Global Health
Project Manager



Ana Krause, RN, MSc (IPH)
PhD Student, Implementation
Science
Research Assistant



Sarah Hicks, MPH
PhD Student, Epidemiology
Research Assistant



Carol Levin, PhD, MSC
Clinical Associate Professor
Global Health
Faculty Lead

START OVERVIEW



Leverages leading content expertise from across the University of Washington



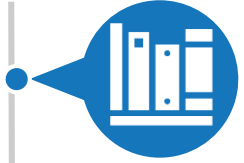
Provides high quality research and analytic support to the Bill & Melinda Gates Foundation and global and public health decision-makers



Provides structured mentorship and training to University of Washington graduate research assistants

PROJECT OVERVIEW

PROJECT OBJECTIVES



To extract current evidence-based literature, established and potential strategies to engage and tailor NTD interventions for hard-to-reach (HTR) populations



To identify optimal channels for delivering services to hard-to-reach populations and extract learnings from other health and non-health areas, strategies used to reach these HTR populations

PRIORITY RESEARCH QUESTIONS

01

Who are these “hard-to-reach populations” in NTD?

02

Who is being missed in reach and why?

03

What interventions have proven promising in reaching these “hard-to-reach populations”?



PROJECT OVERVIEW

PROJECT GOALS

- The research output will be used by the client to inform current and future investment planning for the BMGF NTD team
- Research findings will contribute to the BMGF team's operational research portfolio

PROJECT MOTIVATION

- The NTD team at the Foundation is interested in directly targeting hard- to-reach populations and to explore approaches within NTD and other health programs to better target these populations

PRESENTATION OVERVIEW

OBJECTIVE: HIGHLIGHT KEY FINDINGS AND LAY FOUNDATION FOR DISCUSSION ON FUTURE OPPORTUNITIES



**PROJECT
BACKGROUND**



**RESEARCH
METHODS**



**ANALYSIS
OF FINDINGS**



DEEP DIVE



**WHO IS BEING
MISSED & WHY?**



**KEY FINDINGS
& SUMMARY**

BACKGROUND

NTD Epidemiological Context

- Neglected tropical diseases (NTDs) are a group of preventable and treatable parasitic, viral, bacterial, fungal, and non-communicable diseases that affect more than one billion people globally
- Of twenty (20) NTDs in the world, five account for largest burden of disease, and can be targeted with safe and effective medicines:
 - **Lymphatic filariasis**
 - **Trachoma**
 - **Onchocerciasis**
 - **Schistosomiasis**
 - **Soil-transmitted helminth infections**
- Systemic noncompliance is the biggest threat to elimination efforts and is characterized by **weak programs** and **lack of access** to certain areas and communities
- To achieve elimination targets, it is critical to identify **hard-to-reach populations**, assess the barriers hindering uptake of NTD programs and explore optimal channels for expanding coverage



DEFINING POPULATIONS OF INTEREST

HARD-TO-REACH POPULATIONS (HTRPs)

- HTRPs are often sub-groups of the general population that have higher exposure to infection and/or are missed by health services and interventions
- The populations that are difficult to reach for neglected tropical diseases (NTDs) can vary across regions, even within the same country, and for each specific NTD

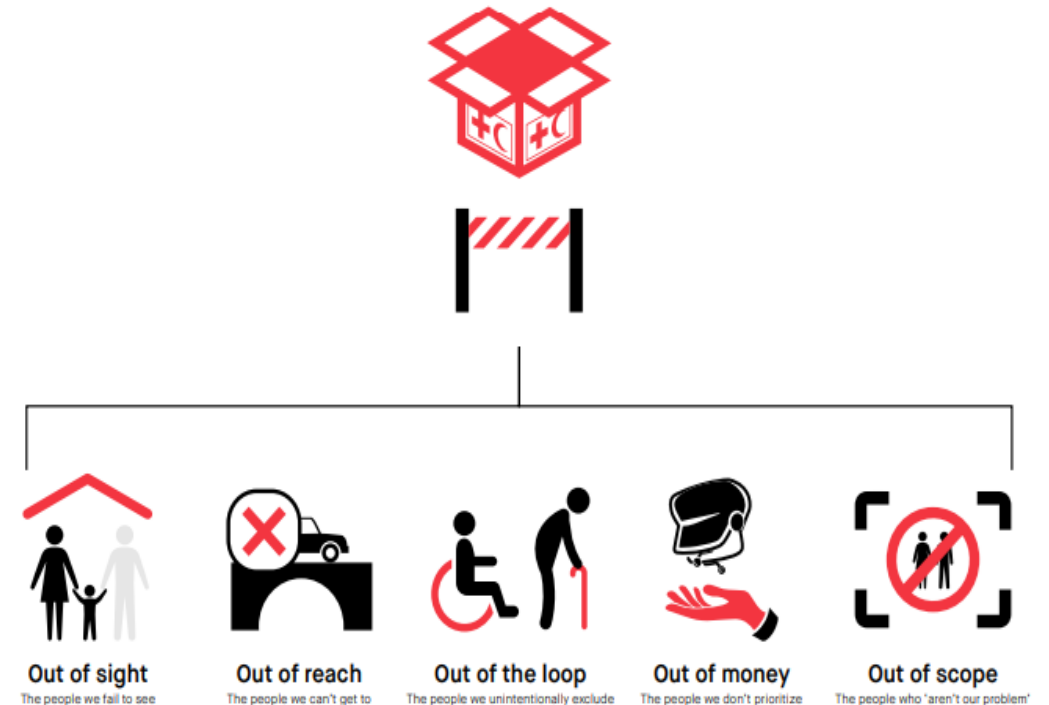
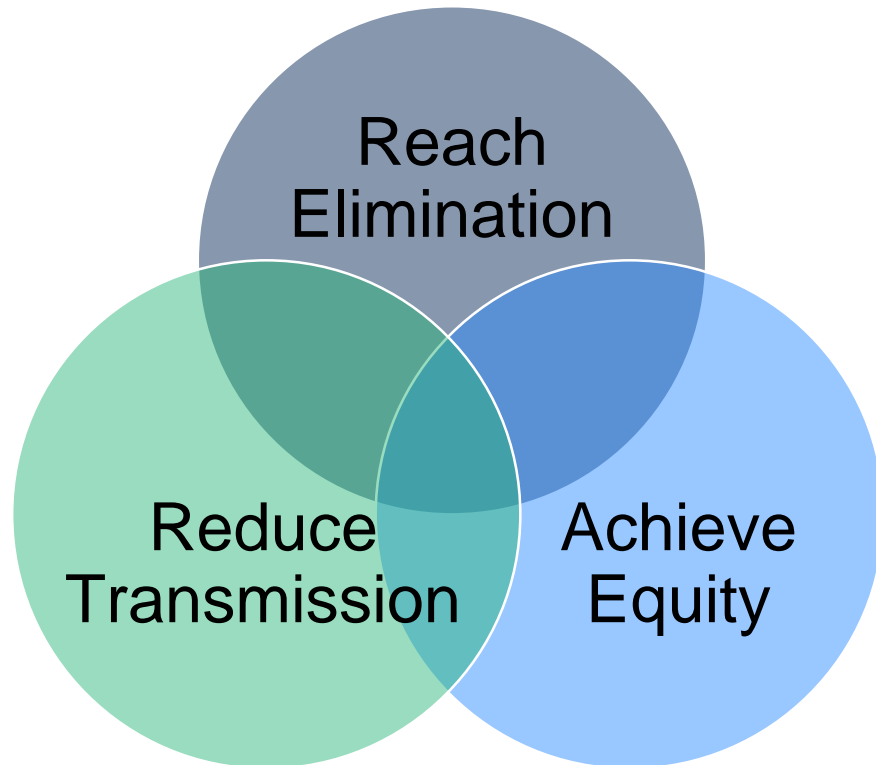


Photo credit  International Federation of Red Cross and Red Crescent Societies

IMPORTANCE OF REACHING THESE HARD-TO-REACH POPULATIONS



- Ensuring widespread outreach is crucial for elimination goals
- Epidemiologically, untreated individuals can contribute to ongoing transmission
- Ensuring access to all is critical to achieve equity as part of Universal Health Coverage

HARD-TO-REACH POPULATION CATEGORIES



Nomadic/pastoralist

- Populations who have no fixed residence but move from place to place usually seasonally and within a well-defined territory



Refugee

- Populations who have been forced to leave their country in order to escape war, persecution, or natural disaster



Cross Border

- Populations who are in border crossing points and transit hubs



Remote setting

- Geographically isolated populations due to one or more factors including distance, terrain, infrastructure, and/or climate



Conflict +IDP camps

- Populations living in a place marked by increased disruption of normal life activities due to war



People who refuse treatment

- A group who may be hard to reach due to factors such as distrust, stigma, and social influences



Low SES/Poverty

- HTR groups due to their physical location, social disadvantages or economic situation, related to structural barriers to services and social determinants of health.



Specific Ethnic group

- Ethnic groups facing one or more factors, such as location, mobility, cultural or traditional values affecting demand or reach of services.

RESEARCH METHODS

METHODS

RESEARCH AND DATA SOURCES

Scoping Review of Published Literature

- Initial broad search using a comprehensive search string (*Appendix 1*)
 - Population specific search using different search strings for each population (*Appendix 2&3*)
 - Databases searched includes; PubMed & Google Scholar

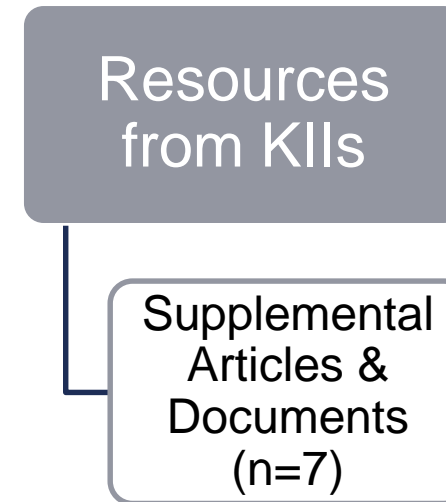
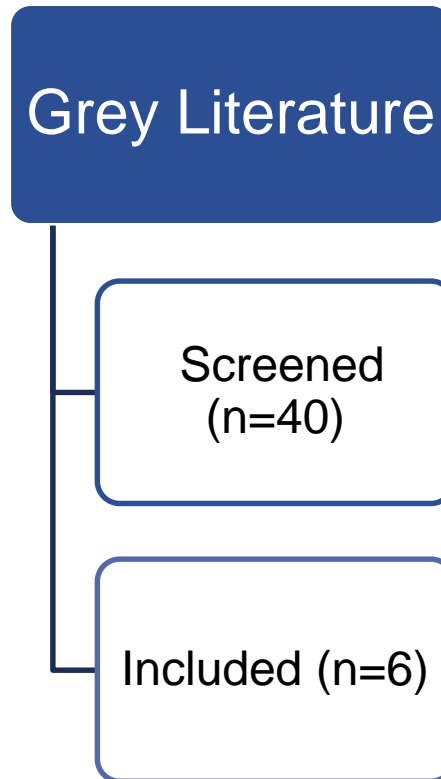
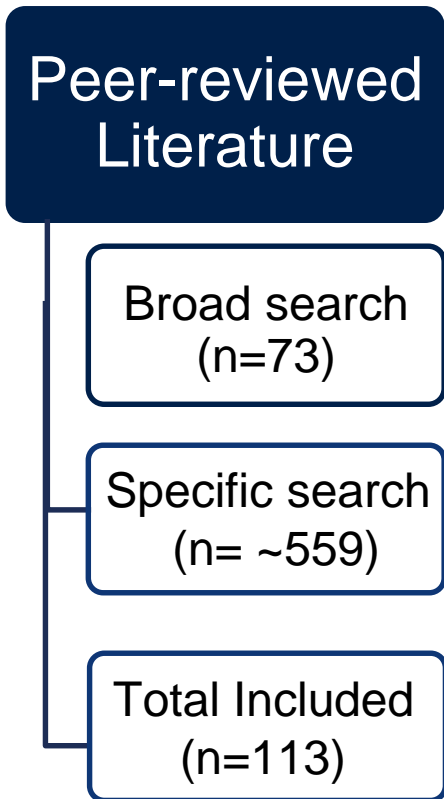
Grey Literature

- INGO and NGO strategy documents, conference records and toolkits
- Grey literature corroborated the published literature findings

Expert Opinions

- Eight (8) subject matter experts in hard-to-reach populations for NTDs and non-NTD

LITERATURE & RESOURCE REVIEW



TOTAL NUMBER OF IDENTIFIED ARTICLES BY HTRPs

HTRP CATEGORY	NTD-SPECIFIC INTERVENTIONS	NON-NTD INTERVENTIONS	TOTAL RELEVANT ARTICLES
Cross border areas	3	3	6
Nomadic populations	6	19	25
Refugees	17*	1	18
Remote locations	14	15	29
Conflict zones & IDPs	6*	1	7
People who refuse treatment	9	0	9
Low SES/poverty/insecure	5	6	11
Specific ethnic groups (TBD)	3	5	8
Total	63	50	113

*some integrated with non-NTD interventions

KEY INFORMANTS

We sought diverse perspectives from experts in “hard-to-reach programs”



- Experts have diverse experiences leading last mile elimination efforts in Africa, Asia and the Caribbean
- Key Expert opinions are included in the findings and summary of this research

LIST OF KIIS

NAME	TITLE	AREAS OF EXPERTISE/RESOURCES
Julianne Meisner	Assistant Professor at UW/US	Epidemiologist & veterinarian working on One Health https://pastres.org/
Ariana Means	Assistant Professor, UW; Associate Editor for PLOS NTDs/US	NTD Implementation scientist
Julie Jacobsen	Affiliate Associate Professor in GH at UW	Extensive background in NTD implementation
Sian Freer	London School of Tropical Medicine (LSTM) Chief operating officer for Centers for Neglected Tropical Diseases (CNTD)	Pioneered UK govt grants effort to eliminate NTDs, oncho and LF in ~24 countries in SSA & South Asia, in partnership with MoH & community partners.
Folake Olayinka	USAID Immunization Technical Lead	Over 2 decades of experience with polio immunization to reach the last child & MNCH programs & malaria programs.
Margaret Baker	Professor at George Washington University	Specialises in design and evaluation of infectious disease control program
Elizabeth (Beth) Long	COR-NTD (Task Force on Global Health)	COR-NTD (Task Force on Global Health)
Jamie Tallant	END fund	Associate vice president of The END Fund

FINDINGS

ANALYSIS OF LITERATURE USING “THE BEST FRAMEWORK”



Behavior

- Physical (risk-reduction, livestock management, etc.), attitudes, institutional (collaborative program design)



Environment

- Environmental sanitation, prevention & control, safe/reliable/affordable/universally accessible and sustainable water infrastructure, integrated vector management



Social Inclusion

- Integration with primary care, empowering communities, addressing stigma and discrimination







Treatment

- Preventive chemotherapy, disease management and self-care, rehabilitation services



FINDINGS

Primary BEST Category	Nomadic (N=25)	Cross-Border (N=6)	Remote Locations (N=29)	Ethnic Groups (N=8)	Conflict Zones & IDP (N=7)	People who Refuse Treatment (N=9)	Low SES (N=11)	Refugees (N=18)	TOTAL (N=113)
 Behavior	7 (26%)	2 (33%)	13 (45%)	3 (38%)	2 (29%)	2 (22%)	2 (18%)	0(0%)	31 (27%)
 Environment	0 (0%)	0 (0%)	3 (10%)	0 (0%)	0 (0%)	0 (0%)	1 (9%)	6 (32%)	10 (9%)
 Social Inclusion	4 (18%)	0 (0%)	4 (14%)	5 (62%)	0 (0%)	1 (12%)	3 (27%)	1 (5%)	18 (16%)
 Treatment	14 (56%)	4 (66%)	9 (31%)	0 (0%)	5 (71%)	6 (66%)	5 (45%)	11 (58%)	54 (47%)

*many articles had interventions that met >1 BEST Category

HTRP STRATEGY OVERVIEW*

ACTIONABLE AT LOCAL, NATIONAL, & INTERNATIONAL LEVELS

Key:



	One Health	Community-Driven MDA	Microplans/Mapping	Social Networks	Integrated Care	Android Apps	Media Messaging	Engage & Treat	Social Mobilization	Livestock Collars	Data Collection Tools	Test & Treat	GIS Mapping	Transport Vouchers	Top-Down Gov. Interventions
International	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful
National	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Established Successful	Novel Successful	Established Successful	Established Successful	Novel Unsuccessful	Novel Unsuccessful
Local	Established Successful	Established Successful	Established Successful	Established Successful	Unsuccessful	Established Successful	Established Successful	Established Successful	Novel Successful	Novel Successful	Novel Successful	Novel Successful	Novel Unsuccessful	Novel Unsuccessful	Novel Unsuccessful

*According to our literature review.

PROMISING STRATEGIES

Relevant for Multiple NTDs



Integrated
Care

Micro
planning

Detailed
Mapping

Social
Networks

Engage &
Treat

Test &
Treat

Strategies can be combined

PROMISING STRATEGIES BY HTRP*

	Nomadic	Cross-Border	Remote Locations	Ethnic Groups	Conflict Zones + IDPs	Refuse Treatment	Low SES	Refugees
Integrated Care	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
Micro Planning	Grey	Grey	Grey	White	Grey	White	White	Grey
Detailed Mapping	Green	Green	Green	White	White	White	White	White
Social Networks	Blue	Blue	White	Blue	White	Blue	White	White
Engage & Treat**	White	White	White	Purple	White	Purple	Purple	White
Test & Treat***	White	White	White	White	White	Cyan	Cyan	White

*According to our literature review.

**Engage & treat: active identification of missed individuals & treatment offered

***Test & treat: active identification of individuals who refused MDA + rapid test +/- treatment offered based on test result

DEEP DIVE

THE ONE HEALTH APPROACH

JOINT DELIVERY OF HUMAN AND ANIMAL HEALTH SERVICES

Teams of veterinary and human health professionals jointly provide health services and health education at the same clinics.

The value of livestock for nomadic pastoralists increases trust in health service provision, leading to higher rates of both human and animal coverage.

Polio vaccination in a One Health campaign in Chad



Campaigns provided in central locations (e.g. primary schools, village centers)



Successful programs leverage partnerships with MOH and Ministry of Livestock and existing animal vaccination programs (FAO biannual campaigns)



Population size estimated via capture, recapture methods using vaccine cards



Education conducted through community mobilizers, local village elders, short movies, and pictorial health aids



MICROPLANNING

01

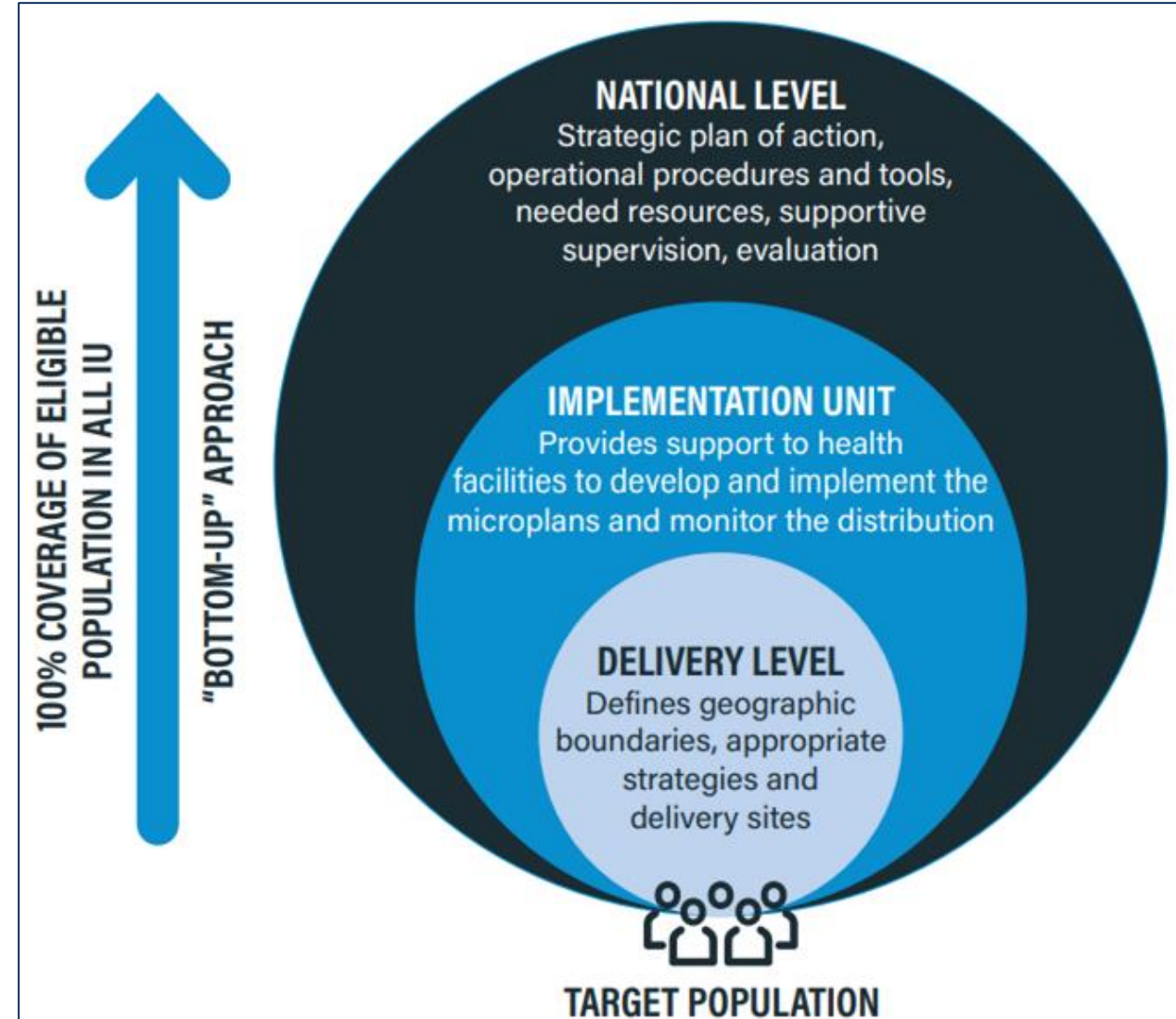
Preparations

02

Planning: Supervisory Areas

03

Planning: Implementation Units



MICROPLANNING IN ACTION

SOMALI PASTORALISTS & POLIO ERADICATION

CLAN LEADERS

Local MOH representatives had first contact with clan elders; communication transferred to social mobilizers



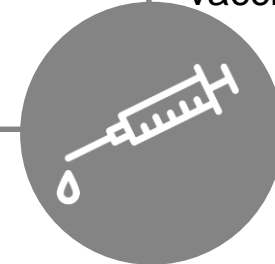
MAPPING

Water points and livestock markets mapped, prompting educational campaigns and engagement of livestock brokers



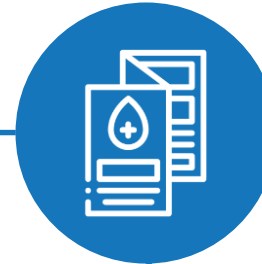
VACCINATIONS

Joint animal-human vaccination campaigns conducted; 611 permanent transit vaccine points founded



CROSS BORDER COLLABORATION

Core Polio Project held 39 cross-border meetings to understand migration patterns and **micro plan**, including validation of populations and establishment of vaccine sites



COMMUNICATION

Development of education kits including pictorial aids and radio content



MICROPLANNING IN ACTION

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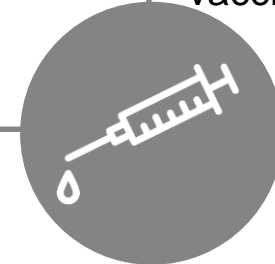
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CROSS BORDER COLLABORATION

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COMMUNICATION

Development of education kits including pictorial aids and radio content

Microplan validation demonstrated a 675% increase in pastoralist settlements; never-vaccinated children decreased from 30% to <20% in a year following microplan revisions.

Integrated Care

Micro planning

Detailed Mapping

Social Networks

Engage & Treat

Test & Treat

NEW TECHNOLOGY

PLATFORM TRANSMITTER TERMINALS



Provided to a single herder
(October 31 to December 10)



Barriers include battery drain
& covered antennae



€800 total (€500 for
transmitter rental & €300 for
data processing fee)



SENSITIZATION EFFORTS

FINDING THE PEOPLE AND COMMUNICATING THE MESSAGE

VILLAGE LEADERS

- Initial contacts made with village leaders & elders
- Leveraging pre-existing partnerships

CHWs & CHVs

- Members of the community
 - Selection from village leaders & market days
- Training on health topic and interpersonal communication

LOCATIONS

- House-to-house sensitization
- Sensitization workshops
- Radio ads and loudspeakers

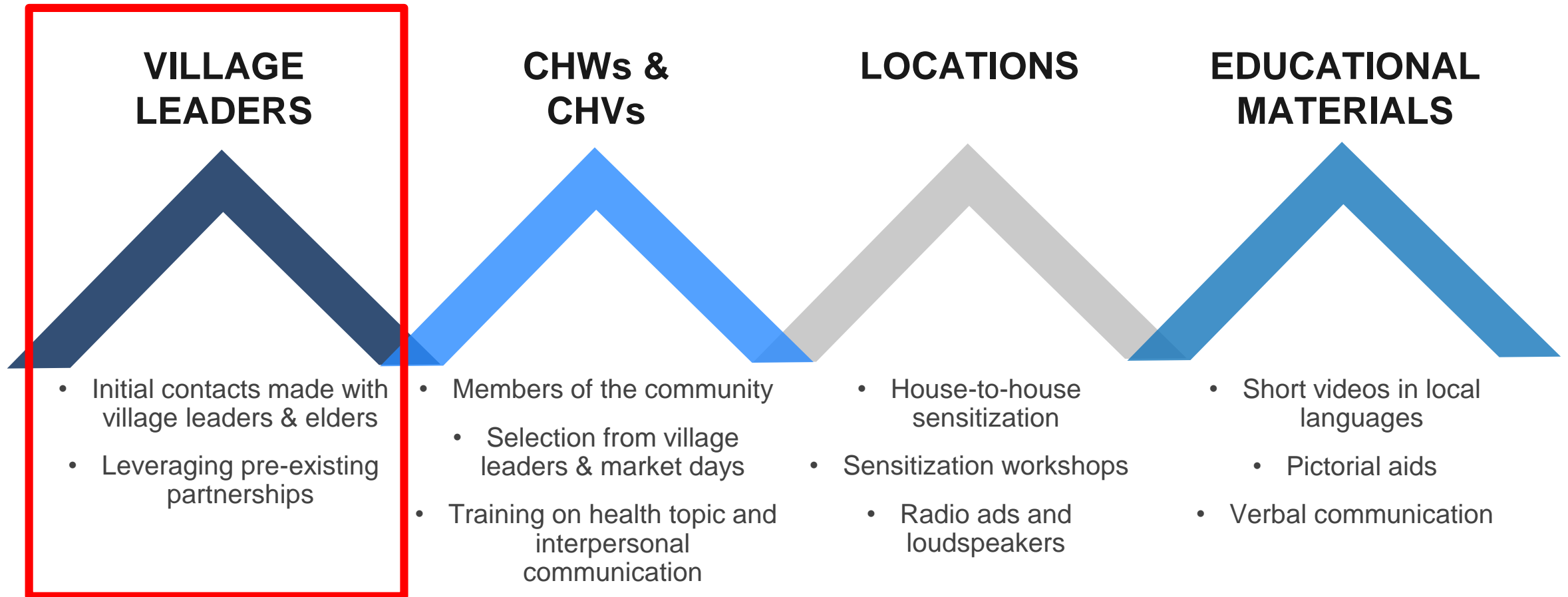
EDUCATIONAL MATERIALS

- Short videos in local languages
 - Pictorial aids
- Verbal communication



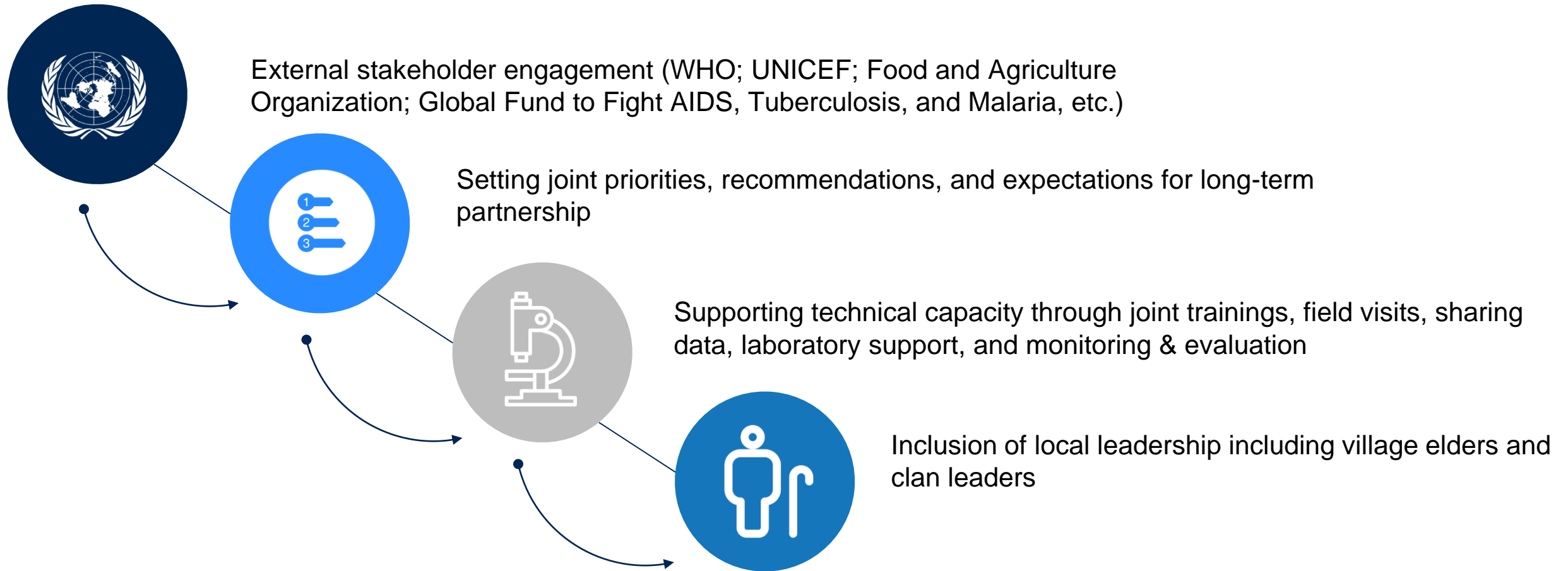
SENSITIZATION EFFORTS

FINDING THE PEOPLE AND COMMUNICATING THE MESSAGE



GOVERNMENT COLLABORATION

SUCCESSFUL CROSS-BORDER PARTNERSHIPS





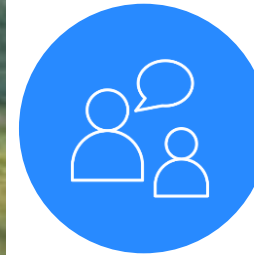
LOCAL LEADERSHIP

SUPPORT FOR CROSS-BORDER COLLABORATION



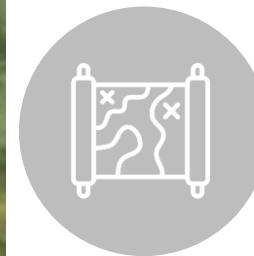
Facilitating field team surveys

- Administrative arrangements and ensuring security on visits



Ensuring safety of field teams

- Linkages to field guides or offering to take field teams themselves



Provision of logistical support

- Maps identifying rivers for entomological assessments



‘ENGAGE & TREAT’ + ‘TEST & TREAT’

INTERVENTION TARGETING PEOPLE WHO *NEVER* OR *SELDOM* PARTICIPATE IN MDA IN GHANA

19.4%

of eligible population missed

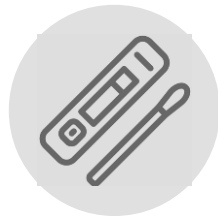
- inaccurate MDA registers
- dose pole ill adapted for stunted children

- + 5.6% of the population refused or had fear of side effects
- Total = >26,500 people

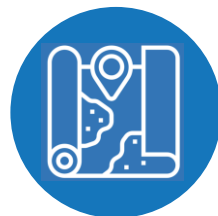
Participants purposefully assigned to one of two groups:



Engage & Treat → Absent during MDA



Test & Treat → Refusal or Fear of MDA



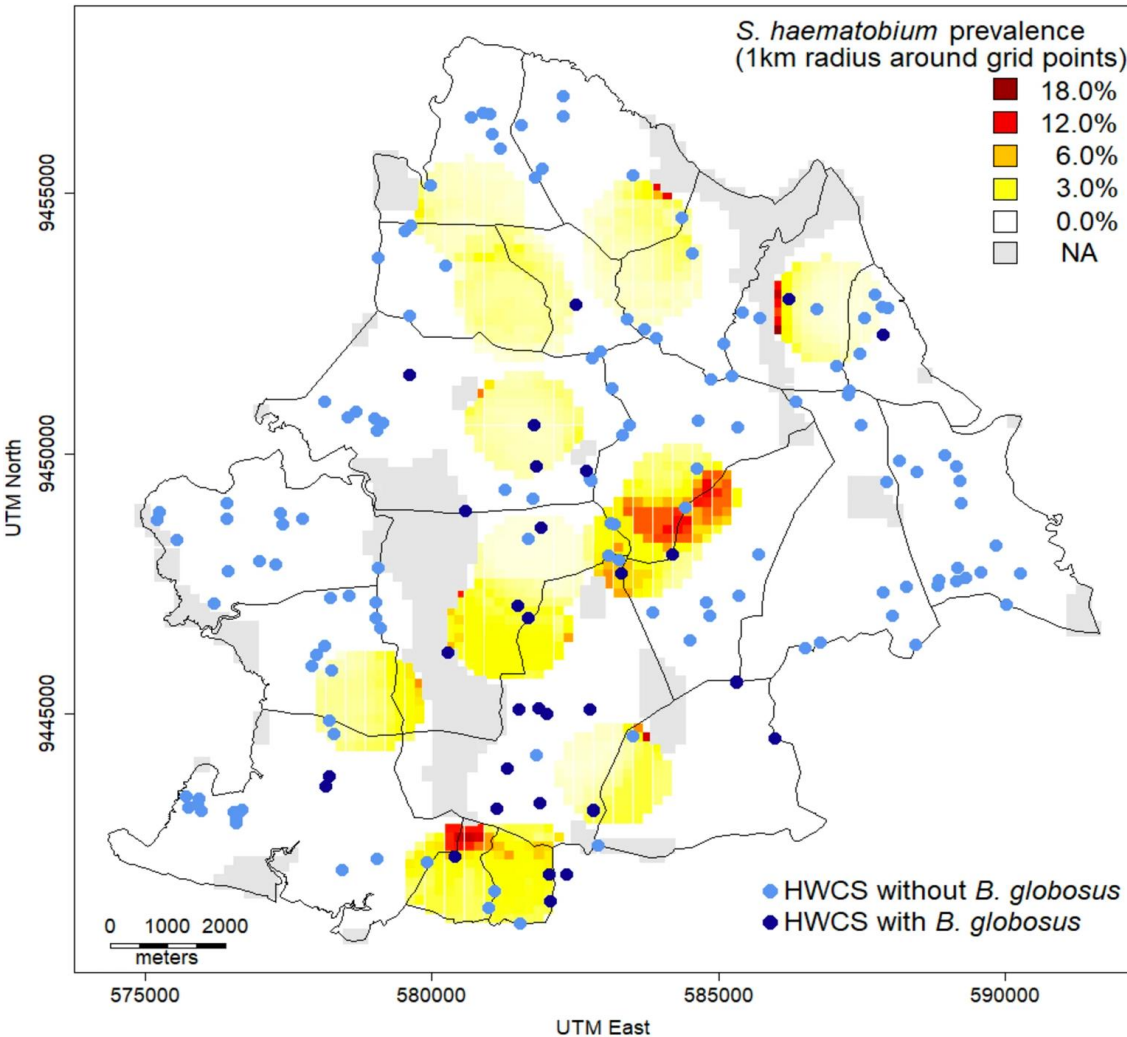
Community Sensitization + Mapping

97%
uptake



NOVEL INTERVENTIONS

AN ONGOING STUDY OF POTENTIAL INTEREST



Schisto-Break Study 2020-2024

‘Novel tools and strategies for breaking schistosomiasis transmission’

- Fine-scale mapping to identify hotspots and micro-target MDA
- Pemba, Tanzania
- Baseline Surveillance completed

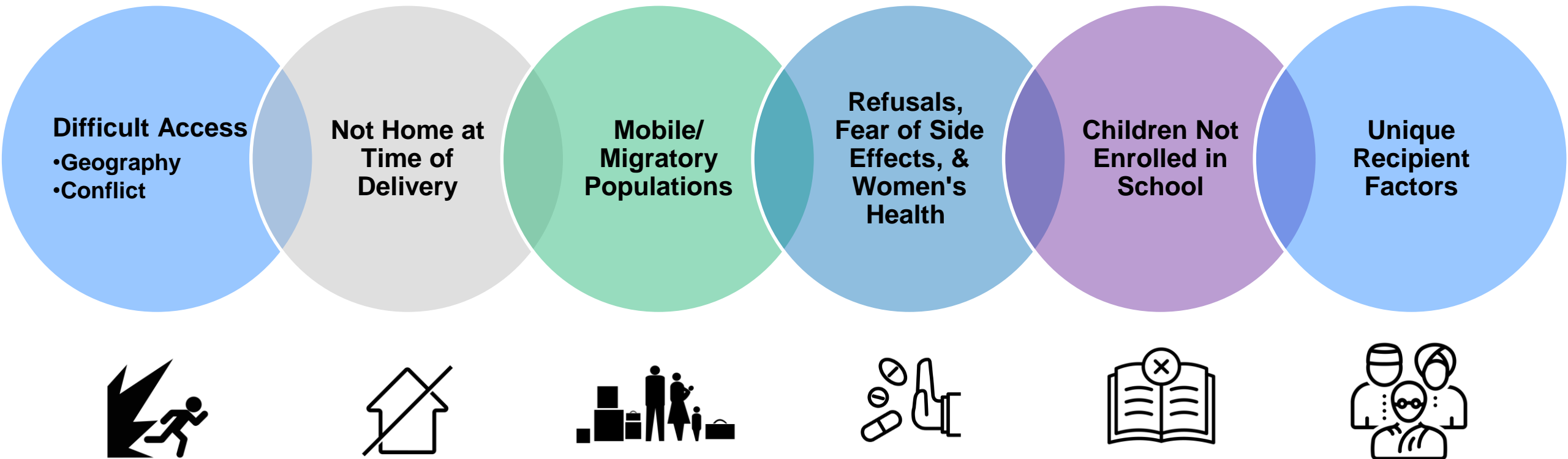


WHO IS BEING MISSED & WHY?

WHO IS BEING MISSED & WHY?

Current Interventions may not be sufficiently adapted to Hard-To-Reach Populations

Recipient Factors



WHO IS BEING MISSED & WHY?

Current Tools & Strategies may not be Sufficiently Adapted to Hard-To-Reach Populations

Implementation Factors

Inaccurate
Census or
MDA register

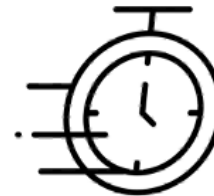
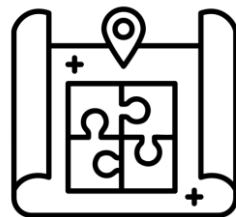
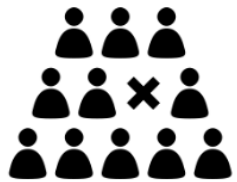
Lack of
disaggregated
data

Mapping:
Convenience
Sampling

Time
Limitations

Tool
Limitations

Poor Planning



KEY TAKEAWAY & SUMMARY

REACHING HARD-TO-REACH POPULATIONS

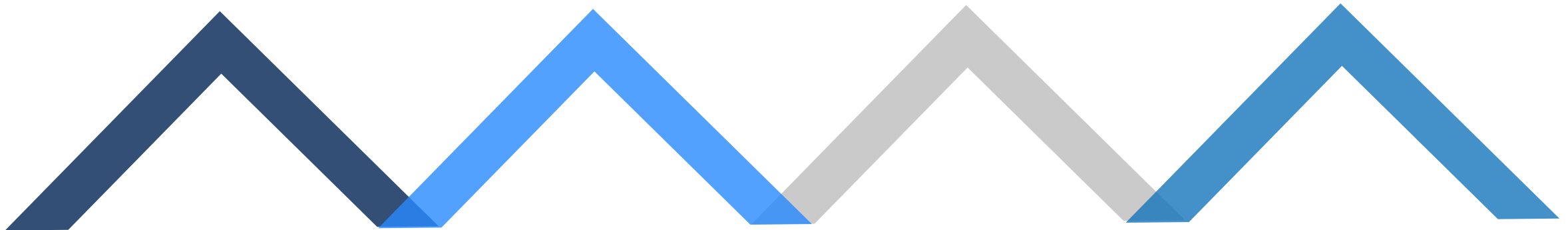
ACKNOWLEDGING ADDITIONAL TIME & RESOURCE NEEDS

PLANNING

ATTENTION

TIME

PARTNERSHIP



To Address Population, Individual, and Program Factors to Improve Program Reach

REACHING HARD-TO-REACH POPULATIONS

NOVEL VS. ESTABLISHED STRATEGIES



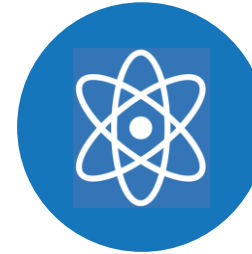
**Novel Strategies may
have a Role in Reaching
Hard-To-Reach
Populations**

**BUT Established
Strategies are currently
more Robust,
Scaleable, and
Sustainable if Tailored
to population needs**



REACHING HARD-TO-REACH POPULATIONS

ACADEMIC LITERATURE IS A BUILDING BLOCK THAT MAY REQUIRE INSIGHTS FROM THE FIELD



Efficacy > Implementation

- Academic literature does not always detail the implementation
- e.g. Haiti's NTD program reaching 100% geographical coverage in 14 years



Contextual Understanding is Vital

- Understand *why* existing programs may not be reaching HTRPs
- Address HTRP needs using a tailored approach
- Build better relationships + trust

ADDITIONAL CONSIDERATIONS

ETHICAL ISSUES & OPPORTUNITIES

Some groups may not want to be reached

- Isolated tribes
- MDA in non-infected children



Emphasis of MDA in HTR areas, over other essential & life-saving medications, can exacerbate feelings of marginalization.

- People's most pressing health needs are not being met.

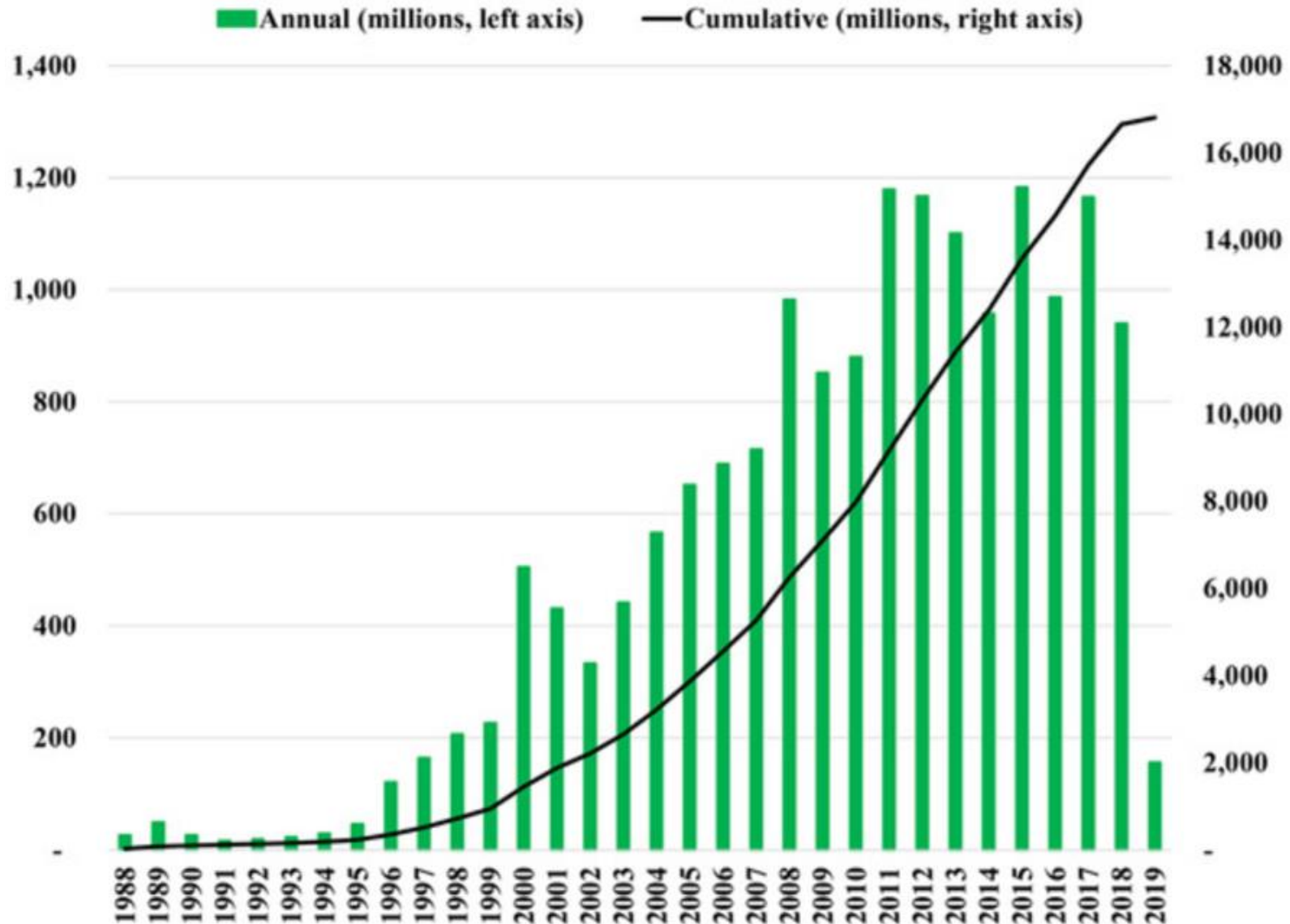


However, this may present opportunities for further integration of care.



REACHING THE LAST MILE IS EXPENSIVE

LESSONS LEARNED FROM THE GLOBAL POLIO ERADICATION INITIATIVE (GPEI)



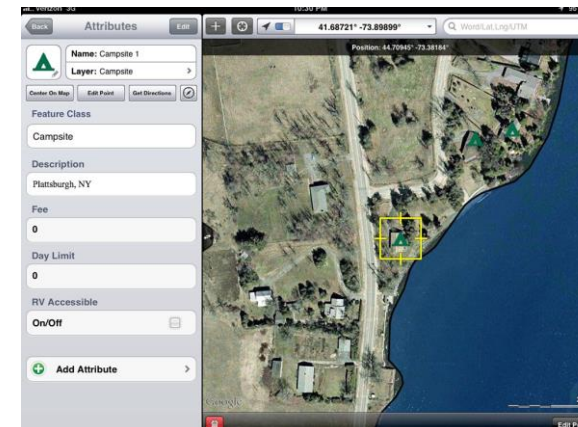
SUMMARY OF STRATEGIES

(SUCCESSFUL & LESS SUCCESSFUL STRATEGIES)

EXAMPLES FROM LITERATURE

Successful Strategies

- One Health approaches
- Community driven MDA
- Microplanning
- Text reminders in local language using a One Android app (child vaccinations)
- Media messaging
- Engage + Treat
- Social mobilization
- Livestock collaring: use of apps to track animal movement
- Use of data collection tools to collect coverage data
- Use of GIS to map high endemicity hotspot



GIS mapping: Photo: Google

Less successful strategies

- Mobile transport vouchers were minimally successful due to low literacy and poor infrastructure
- Animal enclosures built without community input
- Digital health interventions not able to overcome structural barriers for chronic diseases

CONCLUSION

CONSIDERATIONS FOR ALL HARD-TO-REACH-POPULATIONS



Reaching HTRPs requires tailored and context-specific approaches

- One size does not fit all
- Communities are not homogeneous



"Don't dismiss the non-flashy innovations"

- So much comes down to relationship & trust building
- Investments in established strategies for scale-up and sustainability



Consider integrated approaches to care

- Capitalize on and support existing infrastructure and programming with greater buy-in
- Parallel programming is resource intensive

QUESTIONS & DISCUSSION

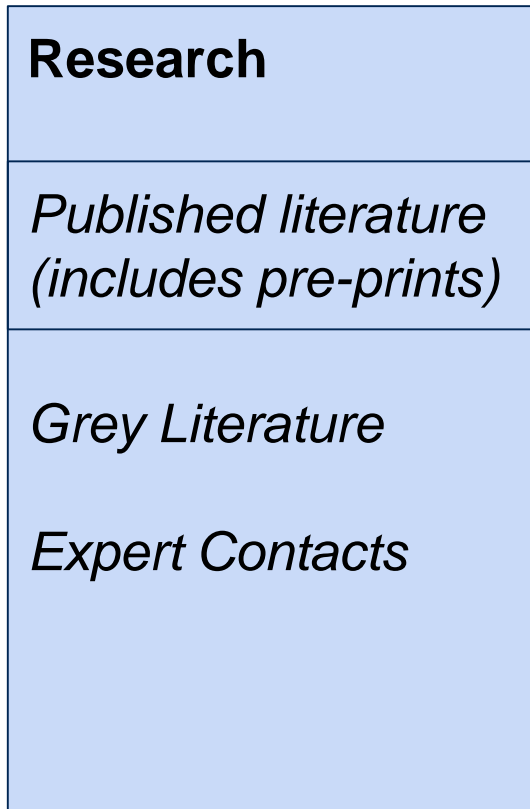
THANK YOU



START CENTER
STRATEGIC ANALYSIS,
RESEARCH & TRAINING CENTER

APPENDIX

BROAD LITERATURE REVIEW (N= 73)



Search String	Results
<p>NTD specific results (“neglected diseases”[MeSH] OR “neglected disease*” or “neglected tropical disease*” OR “NTD*” OR “helminthiasis”[MeSH] OR “leprosy”[MeSH] OR “lymphatic filariasis”[MeSH] OR “onchocerciasis”[MeSH] OR “schistosomiasis”[MeSH] OR “trachoma”[MeSH]) AND (“Primary prevention”[MeSH] OR “Secondary prevention”[MeSH] OR “intervention*”) AND (“difficult to reach” OR “hard to reach” OR “HTR*” OR “HTRP*” OR “hard-to-reach” OR “hard-to-reach population” OR “hard to reach population”)</p>	16
<p>Non-NTD specific results (“Primary prevention”[MeSH] OR “Secondary prevention”[MeSH] OR “intervention*”) AND (“difficult to reach” OR “hard to reach” OR “HTR*” OR “HTRP*” OR “hard-to-reach” OR “hard-to-reach population” OR “hard to reach population”) AND (“developing countries”[MeSH] OR “developing countr*” OR “LMIC*” OR “low and middle income countr*” OR “low income countr*” OR “middle income countr*”)</p>	57

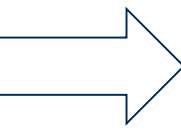
HTRP-SPECIFIC SEARCH STRINGS & RESULTS

Research

*Published literature
(includes pre-prints)*

Grey Literature

Expert Contacts



HTRP	Search String	Initial Results	Relevant papers
Nomadic Populations	((pastoral OR nomad* OR migrant*) AND (interventions OR access OR reach)) AND ("neglected tropical disease*" OR NTD OR "neglected disease*")	59	20
Cross-Border Areas	(("cross border" OR "border cross*") AND (interventions OR access OR reach)) AND ("neglected tropical disease*" OR NTD OR "neglected disease*")	10	6
Refugees	(("refugees"[MeSH] OR "refugee*" or "asylum seeker" OR "Refugee camps"[MeSH] OR "refugee camp*") AND (interventions OR access OR reach)) AND ("neglected tropical disease*" OR NTD OR "neglected disease*")	25	18
Conflict Zones & IDPs	(("Armed Conflicts"[MeSH] OR "conflict zone*") AND (interventions OR access OR reach)) AND ("neglected tropical disease*" OR NTD OR "neglected disease*")	5	7
	(("internally displaced people" OR "internally displaced" OR "internally displaced person*" OR "IDP" OR "IDPs") AND (interventions OR access OR reach)) AND ("neglected tropical disease*" OR NTD OR "neglected disease*")	12	

HTRP-SPECIFIC SEARCH STRINGS & RESULTS

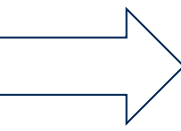
HTRP	Search String	Initial Results	Relevant papers
Remote Setting	((("rural population"[MeSH] OR "rural health services"[MeSH] OR "remote" OR "remote location*" OR "remote population*") AND (interventions OR access OR reach)) AND ("neglected tropical disease*" OR NTD OR "neglected disease*") delivering medication to rural more remote populations	249	29
People who refuse treatment	((treatment refusal OR refused*) AND (interventions OR access OR reach)) AND ("neglected tropical disease*" OR NTD OR "neglected disease*")	71	19
Ethnic Groups/Low SES	("Peul" OR "Tuareg" OR "Mursi" OR "Hamar" OR "Oromo" OR "Karo" OR "Daasanach" OR "Afar" OR "Ogiek" OR "Sengwer" OR "Yaaku Waata" OR "Sanya" OR "Endorois" OR "Turkana" OR "Maasai" OR "Samburu" OR "Wolof" OR "Fula" OR "Serer" OR "Jola" OR "Dinka" OR "Shilluk" OR "Lango" OR "Kakwa" OR "Didinga" OR "Balanda Bviri" OR "Bahr el Ghazal" OR "Guor Marial" OR "Dongotono" OR "Pojuju" OR "Mbororo Fulani" OR "Toubou" OR "Yoruba" OR "Igbo" OR "Kanuri" OR "Ijaw" OR "Ibibio" OR "Edo" OR "Itsekiri" OR "Idoma" OR "Igala" OR "Efik" OR "Isoko") AND (interventions OR access OR reach) AND ("neglected tropical disease*" OR NTD OR "neglected disease*") ("Mbororo Fulani" OR "Afar") AND (interventions OR access OR reach) AND ("neglected tropical disease*" OR NTD OR "neglected disease*")	12 22	7 1

Research




Published literature (includes pre-prints)

Grey Literature



Expert Contacts







NOMADIC POPULATIONS (N=25)

Primary Focus	Specific interventions & Lessons Learned	Findings	Refs.
 <p>Treatment (N=14)</p>	<ul style="list-style-type: none"> Plurality of studies (N=7) emphasized One Health approaches to intervention delivery, including partnership with animal vaccine campaigns Community-driven MDA effective in increasing MDA coverage Mobile clinics grounded in community participation less effective at increasing health service coverage 	<ul style="list-style-type: none"> Across studies, the integration of local community members as drug distributors/sensitizers was very effective (media messaging; pictograms, videos) Legal status of immigrants found to significantly impact intervention participation Tracking populations via micro planning and community-drawn maps improved vaccine coverage 	1-14
 <p>Behavior (N=7)</p>	<ul style="list-style-type: none"> WASH education sessions reduced contaminated household water from 31% to 11% Three studies assessed Google Earth, satellite imagery, and Platform Transmitter Terminals (PTTs) to identify and track migration patterns 	<ul style="list-style-type: none"> Hosting educational sessions during convenient times for target audience improved attendance Google Earth mapping was less accurate and less expensive than PTTs Monetary incentives for participatory mapping increased participation, especially among women 	15-21
 <p>Social Inclusion (N=4)</p>	<ul style="list-style-type: none"> Participatory rural appraisal used to delineate seasonal migration patterns among nomadic Somali community in northeast Kenya Pilot study in Cambodia promoted health-seeking behaviors by highlighting community members with positive behaviors (malaria treatment) 	<ul style="list-style-type: none"> Including women in intervention planning/execution important for comprehensive coverage Provision of MDA regardless of legal status or ability to pay essential for programs with historically marginalized populations Preliminary evidence for promoting community members with positive health behaviors 	22-25



CROSS BORDER POPULATIONS (N=6)

Primary Focus	Specific interventions & Lessons Learned	Findings	Refs.
 <p>Treatment (N=4)</p>	<ul style="list-style-type: none"> Implementation of biannual cross-border MDA successfully met WHO MDA stopping guidelines for onchocerciasis in the Galabat and Metema districts in Ethiopia & Sudan The '3+1' intervention included intensive interventions, maintenance of intensified surveillance, universal coverage of malaria surveillance to detect outbreaks, and collaborative support between the governments of Myanmar and China. This border region declared malaria free by WHO in June 2020. 	<ul style="list-style-type: none"> Successful cross-border interventions have intensified interventions and surveillance (e.g., biannual vs annual MDA campaigns) Government cooperation is key; in the Galabat-Metema districts, Sudanese officials agreed to continue annual MDA while waiting for Ethiopia to complete its own stop MDA assessments in 2016 	1-4
 <p>Behavior (N=2)</p>	<ul style="list-style-type: none"> Rapid Epidemiological Assessment conducted across borders of Uganda, DRC, and South Sudan; onchocerciasis prevalence determined Mano River Union (MRU) established to support cross-border onchocerciasis management in Sierra Leone, Liberia, and Guinea 	<ul style="list-style-type: none"> Cross-border technical training and strengthening enabled laboratory assessment of onchocerciasis in all countries Local district leadership needs to be included in planning/sensitization, especially in border-adjacent districts 	5-6



REMOTE LOCATIONS (N=29)

Primary Focus	Specific interventions & Lessons Learned	Findings	Refs.
 <p>Behavior (N=13)</p>	<ul style="list-style-type: none"> Active malaria case finding, and vector control utilized to evaluate behavioral changes One Android app was developed to provide text reminders for child vaccinations A shadow puppet show in traditional Javanese was beneficial in providing education on soil-transmitted helminths 	<ul style="list-style-type: none"> Engagement with communities, including demand creations and social mobilization, was key to intervention success The integration of multidisciplinary teams increased the breadth of health topics interventions covered and engendered trust with rural communities 	1-13
 <p>Environment (N=3)</p>	<ul style="list-style-type: none"> Two studies focus on identifying fine-scale GPS mapping of water points and snails to break Schistosomiasis transmission 	<ul style="list-style-type: none"> Novel approaches (tablet-based) are low-cost, precise, and easy to implement in the field Low prevalence of schistosomiasis and dropout rates need to be factored in to power calculations 	14-16
 <p>Social Inclusion (N=4)</p>	<ul style="list-style-type: none"> Micro planning and use of participatory methods were key to planning new interventions and addressing barriers to MDA 	<ul style="list-style-type: none"> Insufficient funding for long-term engagement limits impact of interventions Need close monitoring of who is involved in participatory research (e.g. most marginalized) 	17-20
 <p>Treatment (N=9)</p>	<ul style="list-style-type: none"> Combined active and passive case finding helpful for identifying individuals for treatment Two Android apps were utilized by CHWs which reduced time to diagnosis for cutaneous leishmaniasis Social mobilization was key to intervention success 	<ul style="list-style-type: none"> Mobile apps provided training and real-time support for CHWs in the detection of cutaneous leishmaniasis Social mobilization efforts involved a variety of approaches, including community workshops, letters to community leaders, radio station ads, town criers, educational pamphlets, and videos. 	21-29

SPECIFIC ETHNIC GROUPS (N=8)

Primary Focus	Specific interventions & Lessons Learned	Findings	Refs.
 <p>Behavior (N=3)</p>	<ul style="list-style-type: none"> • Radio jingles in the Yoruba language were assessed for behavioral change in regards to Lassa fever prevention among the Yoruba people in Nigeria. • Educational song on oral hygiene for Yoruba children and teenagers • Mobile transport vouchers were used with women of the Samburu people in Kenya to encourage facility-based deliveries 	<ul style="list-style-type: none"> • Radio jingles did increase preventative practices and knowledge, but participants preferred availability in more local dialects • Mobile transport vouchers were minimally successful due to low literacy and poor infrastructure 	1-3
 <p>Social Inclusion (N=5)</p>	<ul style="list-style-type: none"> • For trachoma and schistosomiasis interventions, participants were primarily identified through village leaders and stakeholder analysis. • Non-NTD interventions utilized films or booklets to provide health education and made recommendations for incorporating health activities into culturally relevant activities (e.g. coming of age ceremonies) 	<ul style="list-style-type: none"> • Healthcare workers' refusal to work in remote areas presents a major challenge, including the lack of infrastructure/resources to provide care in these areas. • Inadequate sensitization and mistrust of MDA medications also made engagement with these ethnic groups challenging 	4-8



CONFLICT ZONES & IDPs (N = 7)

Primary Focus	Specific interventions & Lessons Learned	Findings	Refs
 Treatment (N= 1)	MDA-LF program for IDPs in Freetown, Sierra Leone <ul style="list-style-type: none"> Lacking census/surveillance data meant that amount of drugs were underestimated so additional supplies had to be sourced 	<ul style="list-style-type: none"> High MDA coverage was achieved by coordinated, intense, focused social mobilization using traditional and modern strategies (e.g., locally adapted FAQs, agreed upon 'best practices', & imaging/communication) 	1
 Social Inclusion (N= 1)	'Leave No One Behind' MDA for PC NTDs in Nigeria <ul style="list-style-type: none"> Identification and mapping of all IDP camps IDPs selected and trained as drug distributors and appropriately supervised for community-directed MDA Improved coordination between government, NGO partners, and target population 	<ul style="list-style-type: none"> Sustained MDA in 7 IDP camps since 2018 'Joint planning for greater inclusiveness and accessibility to services leaves no one behind' Program being expanded to Niger 	2


Of Note (Refs 3-7):

- Majority (N=5) of articles were on cross-sectional surveys, possibly due to the general dearth of surveillance or census data on IDPs to inform programming.
- Although IDPs were population of interest for these surveys, those in insecure areas were often considered inaccessible for multiple surveys, in some cases this meant 35% of the targeted health areas were excluded.
- Strategies to reach HTRP for surveillance were often not described.



PEOPLE WHO REFUSE TREATMENT (N=9)

Primary Focus	Specific interventions & Lessons Learned	Findings	Refs.
 <p>Behavior (N=2)</p>	<p>Assessment of persons who had experienced adverse effects (AE) during MDA in India</p> <ul style="list-style-type: none"> Understanding individuals' intention to participation in future community MDA campaigns, after experiencing AE with albendazole for soil-transmitted helminths in the DeWorm3 trial in India <p>Unsuccessful intervention in Sudan: building animal enclosures to reduce mycetoma risk</p> <ul style="list-style-type: none"> reported as being a "carefully researched, privately funded, and government-endorsed project" Insufficient consideration of local context, disrespect, poor design, conflicting value systems, structural, social, & cultural barriers 	<ul style="list-style-type: none"> 12% refused immediately following AE 4% refused all future MDA Some castes found to have more positive attitudes towards MDA <ul style="list-style-type: none"> Intervention was broadly rejected by the community Government enforcement and intimidation after discontent worsened relations and trust 	1-2
 <p>Social Inclusion (N=1)</p>	<p>Exploring Gender Dimensions of NTD Programs</p> <ul style="list-style-type: none"> Mixed-methods exploration in eight villages in Eastern Uganda 	<ul style="list-style-type: none"> Treatment registers are often incomplete Males face more barriers to accessing treatment than women due to occupational roles & higher distrust Some women may miss treatment as community drug distributors may be unaware of which medicines are safe for pregnant and breastfeeding women 	3



PEOPLE WHO REFUSE TREATMENT (N=9)

Primary Focus	Specific interventions & Lessons Learned	Findings	Refs.
 <p>Treatment (N=6)</p>	<p>Three qualitative studies on perceptions of and challenges re: MDA in Kenya and Tanzania</p> <ul style="list-style-type: none"> Understanding implementation challenges and opportunities for improved MDA <p>Three interventions that improved MDA or treatment uptake in</p> <ul style="list-style-type: none"> Use of a tailored implementation package for onchocerciasis, based off rapid ethnography data Use of a 'Test & Treat' + 'Engage & Treat' approach + community sensitization to reach people who has either refused or missed MDA 	<ul style="list-style-type: none"> MDA refusals concerns re: side effects, myths, lack of hygiene by drug distributors, mistrust, misperception of need. Many implementation challenges identified relating to poor planning in both countries One MDA suspension due to rumors & poor planning <ul style="list-style-type: none"> Effective increase in coverage by 13% (strong evidence) Many barriers identified <ul style="list-style-type: none"> 97% of targeted recipients received treatment Many key gaps identified (MDA register incomplete, population factors) 	4-9




LOW SOCIOECONOMIC STATUS (N=11)

Primary Focus	Specific interventions & Lessons Learned	Findings	Refs
 <p>Treatment (N= 5)</p>	<p>Social Networks Enhanced Treatment Program Reach</p> <ul style="list-style-type: none"> • Successful LF-MDA intervention among urban poor area in the D.R & the National program in Haiti. Both employed multiple tailored communication channels to reach the community. Emphasis on building trust & leveraging social capital of community organizations. • A decentralized Buruli Ulcer pilot program in Benin found that key clinic staff who were believed to have strong expertise greatly increased community confidence in the program. • Two pre-implementation papers assessing the use of social/friendship networks to increase MDA uptake and a community-embedded model for mental health 	<ul style="list-style-type: none"> • D.R. Elimination achieved after 3 rounds of MDA • Haiti: 100% geographical coverage achieved after 14 years, despite many challenges. • 71% of early-stage ulcers could be treated in the community • 93% were successfully treated with antibiotics • Pre-implementation. The analysis of social networks as a way to increase MDA uptake seems promising. 	1-5
 <p>Social Inclusion (N= 3)</p>	<p>Minimal relevance to search</p> <ul style="list-style-type: none"> • One cross-sectional survey to assess beliefs and predict a woman's attendance for cervical cancer screening among HTR women in Bogota. • One discussion paper on the role of NGOs in building trust 	<ul style="list-style-type: none"> • Lower income associated with a lower health motivation score. Women age 25-30 with higher poverty, also less likely to attend 	6-8

LOW SOCIOECONOMIC STATUS (N=11)

Primary Focus	Specific interventions & Lessons Learned	Findings	Refs.
 <p>Behavior (N=2)</p>	<p>Interventions with high loss to f/u or non stat. sig. results:</p> <ul style="list-style-type: none"> Evaluating participatory action research intervening on unhygienic practices in the a Bangkok slum to prevent childhood diarrhea. Compared practices between an intervention and control group. Participation issues attributed to slum culture/organization, community leadership, family problems, occupational problems, & physical environment. cRCT to evaluate the use of digital interventions (mHealth and eHealth) to improve diabetes and hypertension management in a hard-to-reach population (rural, living with a chronic condition, and low SES) in Cambodia. Peer educators (living with DM or HTN) were randomized into 1 of 3 groups: mobile voice messages + tablet tracking (eHealth by PEs), only tablet tracking, or no intervention. 	<ul style="list-style-type: none"> 64% loss to f/u limits interpretation. Mothers in the intervention group were more likely to wash their hands The mobile voice messages + tablet tracking group had better blood glucose control and blood pressure control than the other two groups, but these differences were not statistically significant. Assessed using RE-AIM & concluded that digital health alone may not be able to overcome structural barriers, which need to be addressed especially for NCDs. 	9-10
 <p>Environment (N=1)</p>	<p>Detailed spatial & parasitological analysis to identify hotspots:</p> <ul style="list-style-type: none"> Locality mapping with GPS + georeferencing of known schistosomiasis cases in Brazil. This data was combined with transmission surveillance sites, voluntary parasitological sampling, + spatial analysis to identify high-risk areas for schistosomiasis to occur. 	<ul style="list-style-type: none"> Current MDA strategies appear insufficient for poor urban areas with higher levels of migration + poorer infrastructure, combined with climate impacts on parasitic transmission and breeding. 	11

REFUGEE POPULATIONS (N =18)

Primary Focus	Specific intervention & Lessons learned	Findings	Refs.
 <p>Treatment (N=11)</p>	<p>Active screen and treat interventions</p> <ul style="list-style-type: none"> Country of origin, migration path, or length of route not necessarily predictive of NTD infection. More HIC evidence. <p>Novel Drug Development for Cutaneous Leishmaniasis</p> <ul style="list-style-type: none"> Early phase, no human subjects <p>Treatment via Primary care</p> <ul style="list-style-type: none"> Higher rates of comorbidities (poor mental health) impacts 'compliance' Drug resistance issues 	<ul style="list-style-type: none"> Can be a cost-effective intervention and facilitate better health outcomes due to early diagnosis and treatment. Lab testing of an immunomodulatory drug (Imiquimod) for leishmaniasis, appears promising. Undocumented refugees often excluded Relies on knowledgeable clinicians esp. for asymptomatic cases Health system often not sufficiently responsive to refugees/migrants, diversity, & specific care needs 	1-11
 <p>Social Inclusion (N=1)</p>	<p>'Leave No One Behind' MDA for PC NTDs in Nigeria</p> <ul style="list-style-type: none"> Identification and mapping of all refugee camps Refugees selected and trained as drug distributors and appropriately supervised for community-directed MDA Improved coordination between government, NGO partners, and target population 	<ul style="list-style-type: none"> Sustained MDA in a refugee camp since 2019 'Joint planning for greater inclusiveness and accessibility to services leaves no one behind' Program being expanded to Niger 	12
 <p>Environment (N=6)</p>	<p>Mapping of habitat suitability for disease vector and to identify/estimate at-risk population</p> <ul style="list-style-type: none"> Detailed spatial analysis and evidence-based weighted-model <p>Modeling estimates for prevalence and at-risk populations</p> <ul style="list-style-type: none"> Weak surveillance systems in LMICs limited strength of model, thus relying mostly on hospital-based surveys. 	<ul style="list-style-type: none"> Can support more efficient use of resources and program targeting to at-risk populations Has not been integrated with actual programming Rough country-wide estimates of disease prevalence for <i>Strongyloides stercoralis</i> prevalence. No incidence data. Asymptomatic infections not captured. 	13-18

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