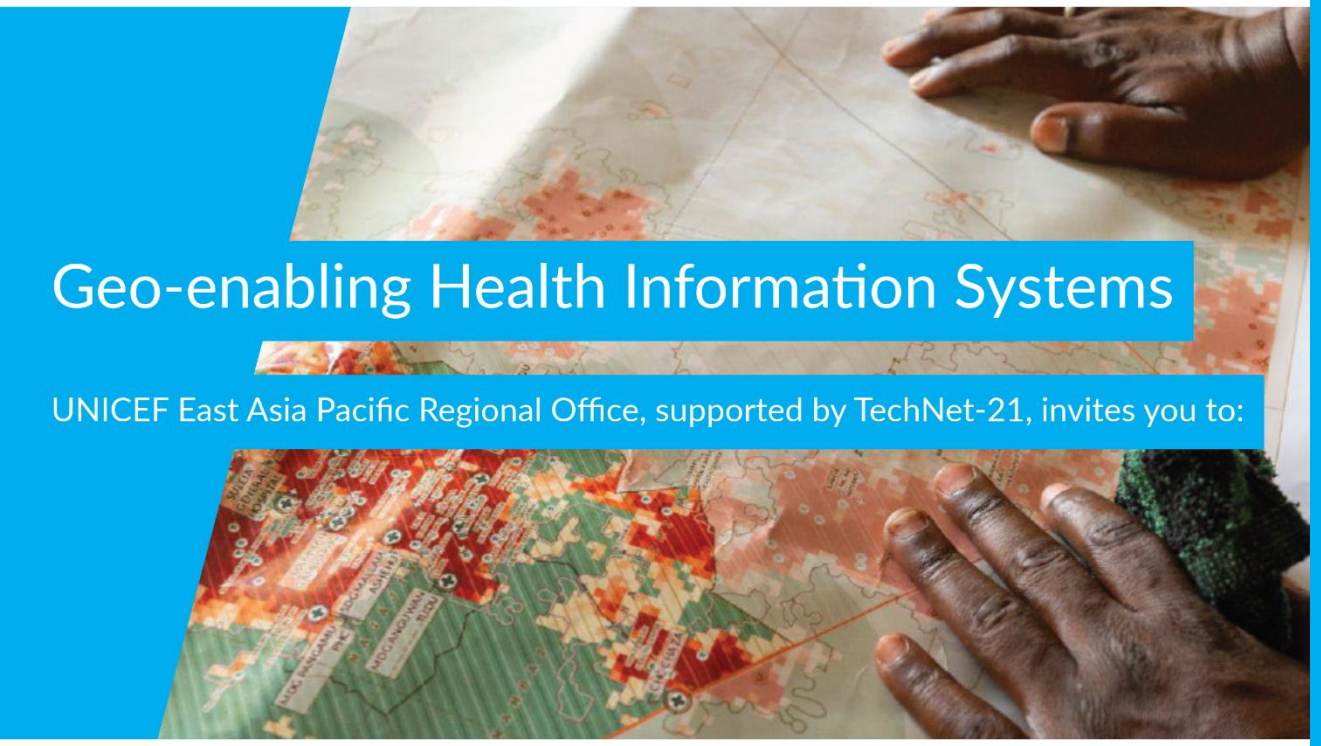
unicef for every child

MORU Tropical Health Network | HEALTH GEOLAB Hub

TechNet-21 The Technical Network for Strengthening Immunization Services



Geo-enabling Health Information Systems

UNICEF East Asia Pacific Regional Office, supported by TechNet-21, invites you to:

Learn how to geo-enable health information systems and programmes

Join us for a bi-weekly web-series starting **19 June 2024**

- Demonstrate the potential of geospatial data and technologies in public health
- Introduce HIS geo-enabling framework and its implementation in countries
- Provide knowledge and resources to implement the HIS geo-enabling framework

Go to https://tn21.org/UNICEF-EAPRO
or Scan QR Code to Register

Register by: 19 June 2024

Joining any one session also permitted

6 Modules of around 2 hours each

Certificates provided on completion by UNICEF & MORU

Geo-enabling the Health Information System, programs or interventions training workshop for Asia Pacific

Welcome & opening, objectives of the workshop, introduction of the facilitator and agenda

Workshop Objectives

Disseminate operational guidance materials that can assist countries in implementing the geo-enablement process for health programs in general and the development and implementation of micro plans in particular

More specifically:

- Demonstrate the potential of geospatial data and technologies in public health
- Introduce the HIS geo-enabling framework and its implementation in countries
- Transfer knowledge, expertise and resources that will allow participants to implement the HIS geo-enabling framework in their respective country

→ At the end of this workshop, it is expected that the participants will have a better understanding of what geospatial data and technologies can bring to public health programs and how to geo-enable their health information system in a sustainable way to benefit from this type of data and technologies

→ This is not a GIS training

Training workshop schedule and agenda

Schedule Module 1
19 June 2024 (Bangkok 12pm / Geneva 6am / Fiji 6pm)

20 min - Welcome & opening, objectives of the workshop, introduction of the facilitator and agenda

40 min - **Session 1**: The geographic dimension and the potential of geospatial data and technologies in public health

30 min - **Session 2**: Examples of application of geospatial data and technologies in public health

30 min - **Session 3**: Introduction to the HIS geo-enabling framework

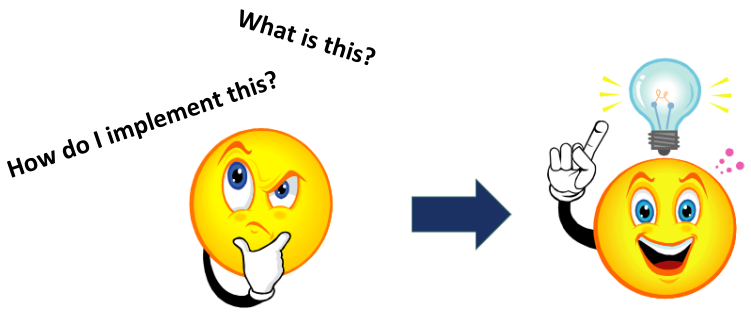
Schedule Module 2
3 July 2024 (Bangkok 12pm / Geneva 6am / Fiji 6pm)

15 min - Recap of Module 1 and agenda of Module 2

30 min - **Session 4**: In-country implementation of the HIS geo-enabling framework

30 min - **Session 5**: Result of the HIS geo-enablement level assessment for Asia and Pacific (priorities and challenges)

30 min - **Session 6:** Understand the geography of the program or intervention



Schedule Module 3
17 July 2024 (Bangkok 12pm / Geneva 6am / Fiji 6pm)

15 min - Recap of Module 2 and agenda of Module 3

30 min - **Session 7**: Result of the geographic features identification performed by the participants

30 min - **Session 8:** Define the purpose, audience, content and format of the final products

15 min – **Session 9**: Identify needed hardware, software and technical expertise

20 min – **Session 10:** Assess the geo-enablement level of the HIS, program or intervention

30 min – **Session 11**: Result of the HIS geo-enablement level assessment for Asia and Pacific (9 elements of the HIS geo-enabling framework)

Schedule Module 4
14 August 2024 (Bangkok 12pm / Geneva 6am / Fiji 6pm)

15 min - Recap of Module 3 and agenda of Module 4

30 min – **Session 12:** Assess the availability, quality and accessibility of data and information: Introduction to the geospatial data management cycle

60 min - **Session 13:** Implement the geospatial data management cycle (define the terminology, data specifications and the ground reference)

15 min - **Session 14**: Implement the geospatial data management cycle (document the data)

45 min - **Session 15** Implement the geospatial data management cycle (compile existing data, identify and fill data gaps

Schedule Module 5
28 August 2024 (Bangkok 12pm / Geneva 6am / Fiji 6pm)

15 min - Recap of Module 4 and agenda of Module 5

30 min – **Session 16:** Introduction to geospatial technologies

30 min - **Session 17:** Introduction to Global Navigation Satellite System (GNSS)

30 min - **Session 18:** Introduction to Geographic Information System (GIS)

30 min - **Session 19:** Introduction to the concepts of registry and Common Geo-Registry (CGR)

Schedule Module 6
11 September 2024 (Bangkok 12pm / Geneva 6am / Fiji 6pm)

15 min - Recap of Module 5 and agenda of Module 6

15 min - **Session 20**: Define the strategy(ies) to be implemented to fill the gaps identified during the assessment

30 min – **Session 21:** Develop the action plan aiming at filling the gaps in the HIS geo-enabling framework

30 min - **Session 22:** Implement the action plan

30 min – **Session 23**: Assess, document and sustain the result of the action plan implementation

15 min - **Session 24**: HIS, program or intervention geo-enabling resources (recap and additional ones)

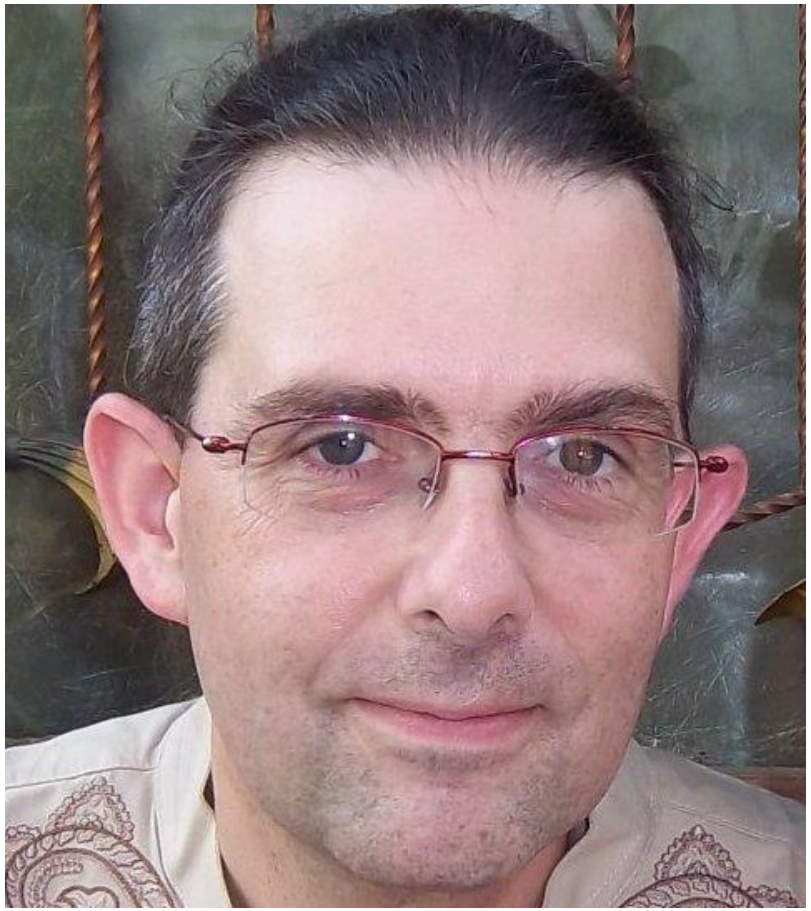
15 min - End of workshop

You will receive a certificate from UNICEF if you attend all the modules

Opening remarks and regional perspective

Basil Rodriques
Regional Adviser, Health
UNICEF EAPRO

Training workshop facilitator



Dr Steeve Ebener

Coordinator and lead for in-country technical assistance at MORU's Health GeoLab Hub.

25 years of experience advising and working with international, regional and national governmental and non-governmental organizations in the health and emergency management sector when it comes to the management and use of geospatial data and technologies.

At the origin, among other things, of the development and implementation of the HIS geo-enabling framework, the Second Administrative Level Boundaries initiative (SALB), the AccessMod tool and the Common Geo-Registry (CGR) concept.

LinkedIn profile: https://www.linkedin.com/in/steeveebener/

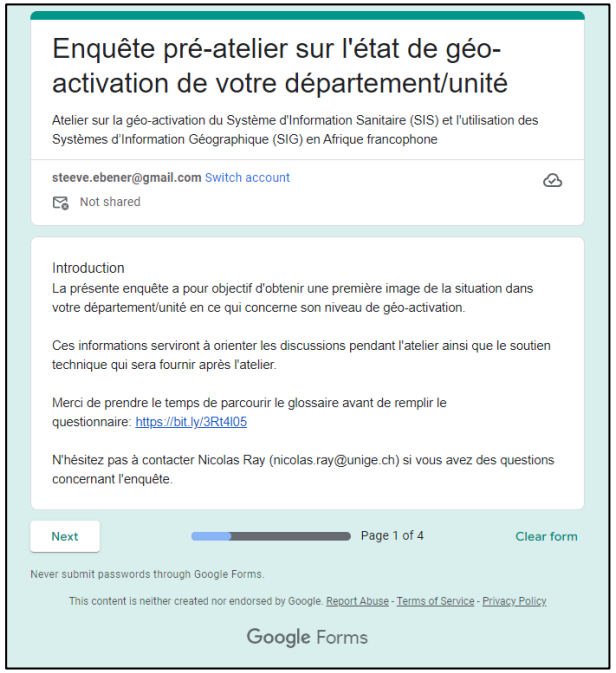
Geo-enabling the Health Information System, programs or interventions training workshop for Asia Pacific

...and beyond

Module 1 – 19 June 2024

HIS geo-enabling technical support to French-speaking African countries

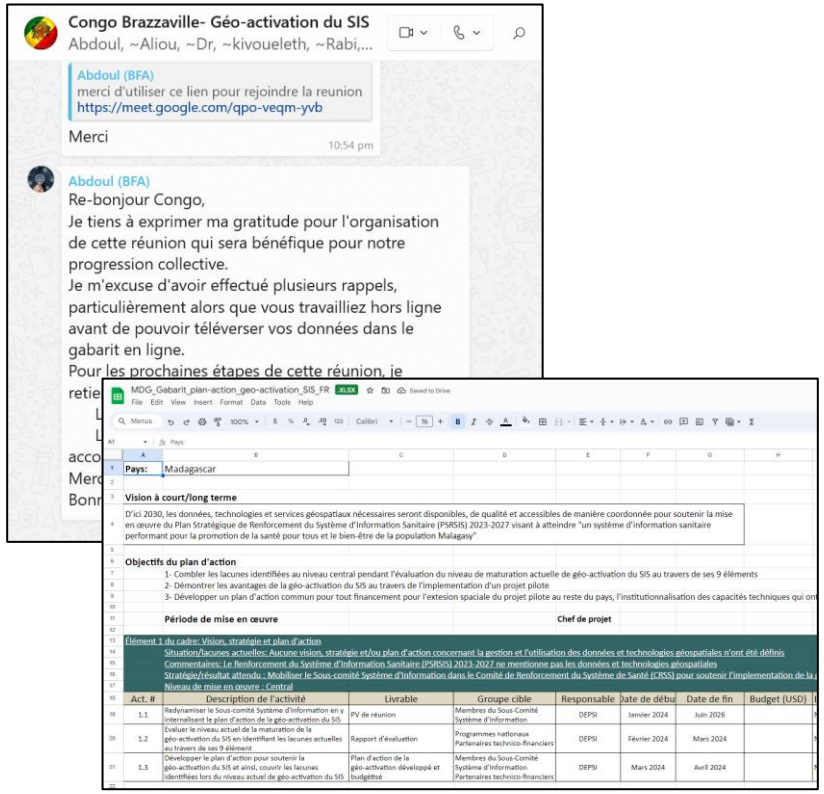
Activity supported by the Global Fund and implemented in collaboration with the University of Geneva and the University Amadou Mahtar MBOW (UAM) of Dakar to help countries geo-enable their Health Information System (HIS)



Pre-workshop survey to assess the current level of geo-enablement across Malaria, TB and HIV programs as well as the unit in charge of the Health Information System (HIS)

In French

Workshop (Saly – Senegal, 6-10 November 2023) attended by 55 participants from 11 countries to take them through the HIS geo-enabling concept and process, finalize the assessment and strengthen their technical capacity



Post-workshop technical support provided to 10 countries to help them develop an action plan aiming at filling the gaps identified during the assessment

Training workshop material

https://bit.ly/4d2nfTS

REFERENCE_MATERIAL

PRESENTATIONS

Geo-enabling the Health Information System, programs or interventions training workshop for Asia Pacific

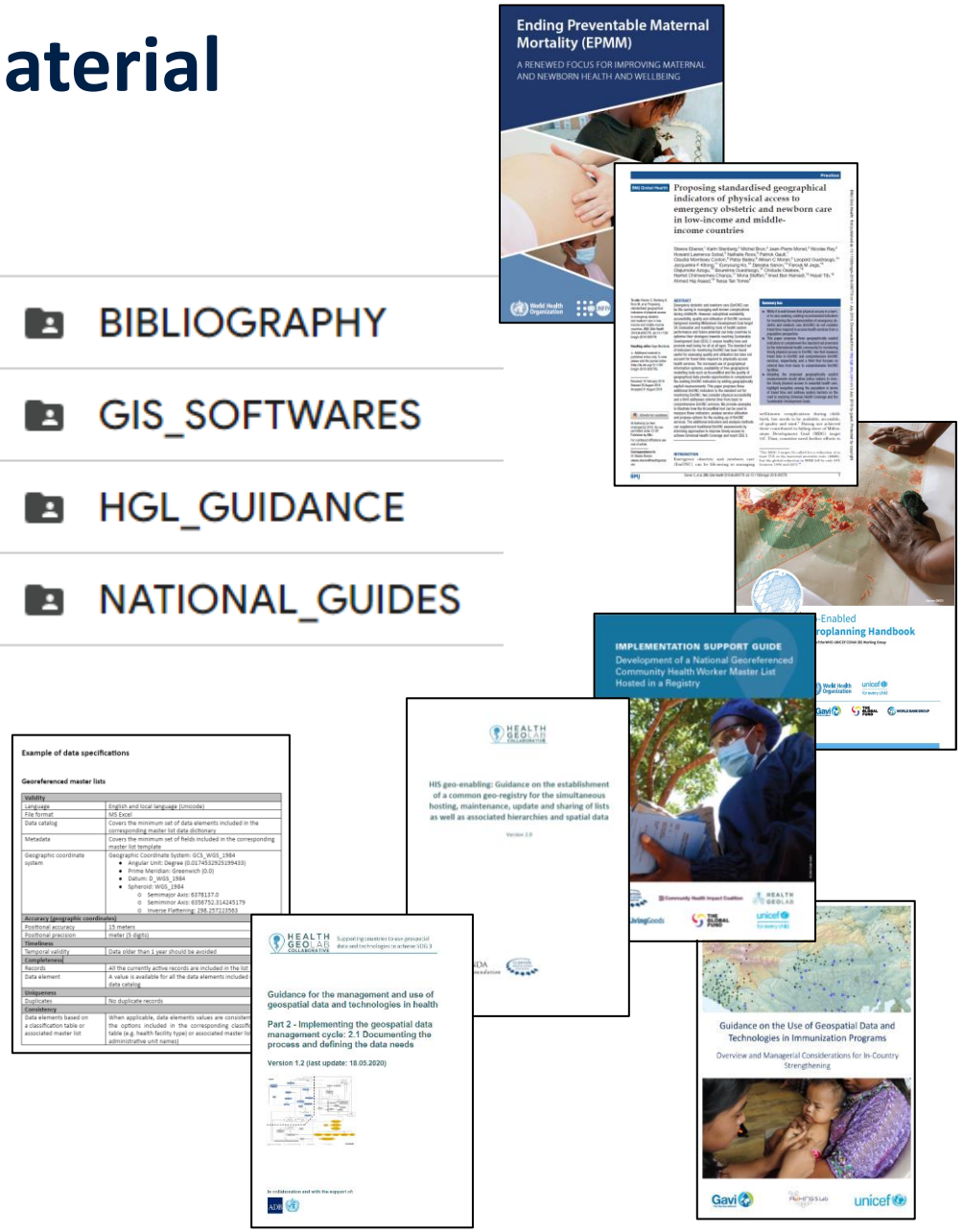
Session 1: The geographic dimension and the potential of geospatial data and technologies in public health

BIBLIOGRAPHY

GIS_SOFTWARES

HGL_GUIDANCE

NATIONAL_GUIDES

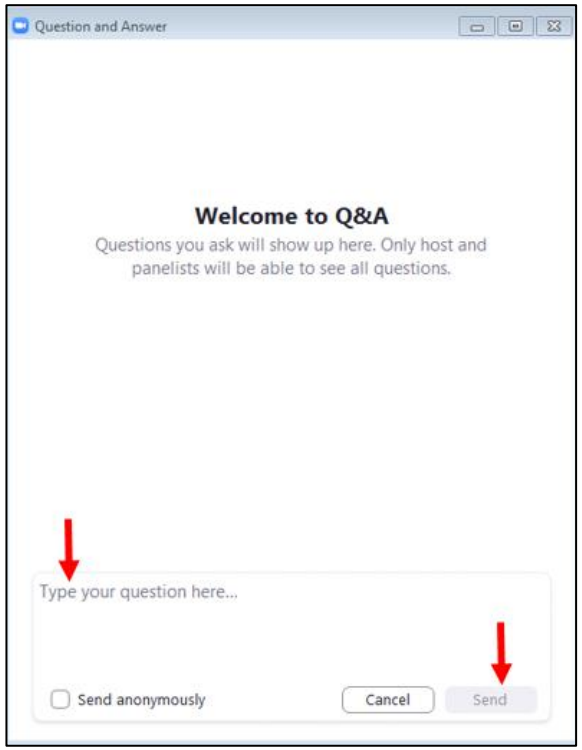


Glossary of terms: https://bit.ly/37Wje0v

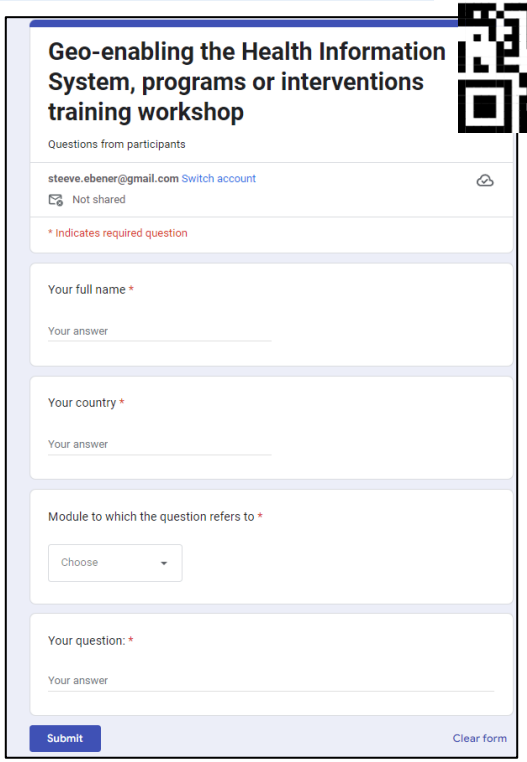
Recording of each module will be made available

Questions and knowledge sharing during the modules?

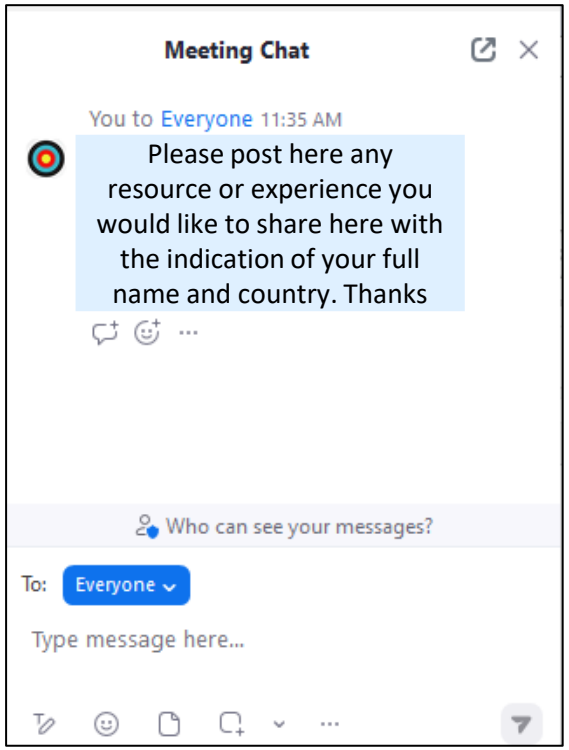
https://tinyurl.com/3999y744



Please post your questions in the Zoom Q&A (not the chat)



You can also ask questions using this short Google form (between modules for example)



You can share any resource or experience you see relevant to the participants in the chat

We will also be using the chat to share information

We will answer them as much as possible during the modules

Agenda – Module 1

20 min - Welcome & opening, objectives of the workshop, introduction of the facilitator and agenda

40 min - **Session 1**: The geographic dimension and the potential of geospatial data and technologies in public health

30 min - **Session 2**: Examples of application of geospatial data and technologies in public health

30 min - **Session 3**: Introduction to the HIS geo-enabling framework

➡ Introduction to the potential of geospatial data and technologies and of the framework we developed and are implementing in countries to geo-enable the HIS, programs or interventions

Geo-enabling the Health Information System, programs or interventions training workshop for Asia Pacific

...and beyond

Session 1: The geographic dimension and the potential of geospatial data and technologies in public health

Public Health

"All organized measures (whether public or private) to prevent disease, promote health, and prolong life among the population as a whole."[1]

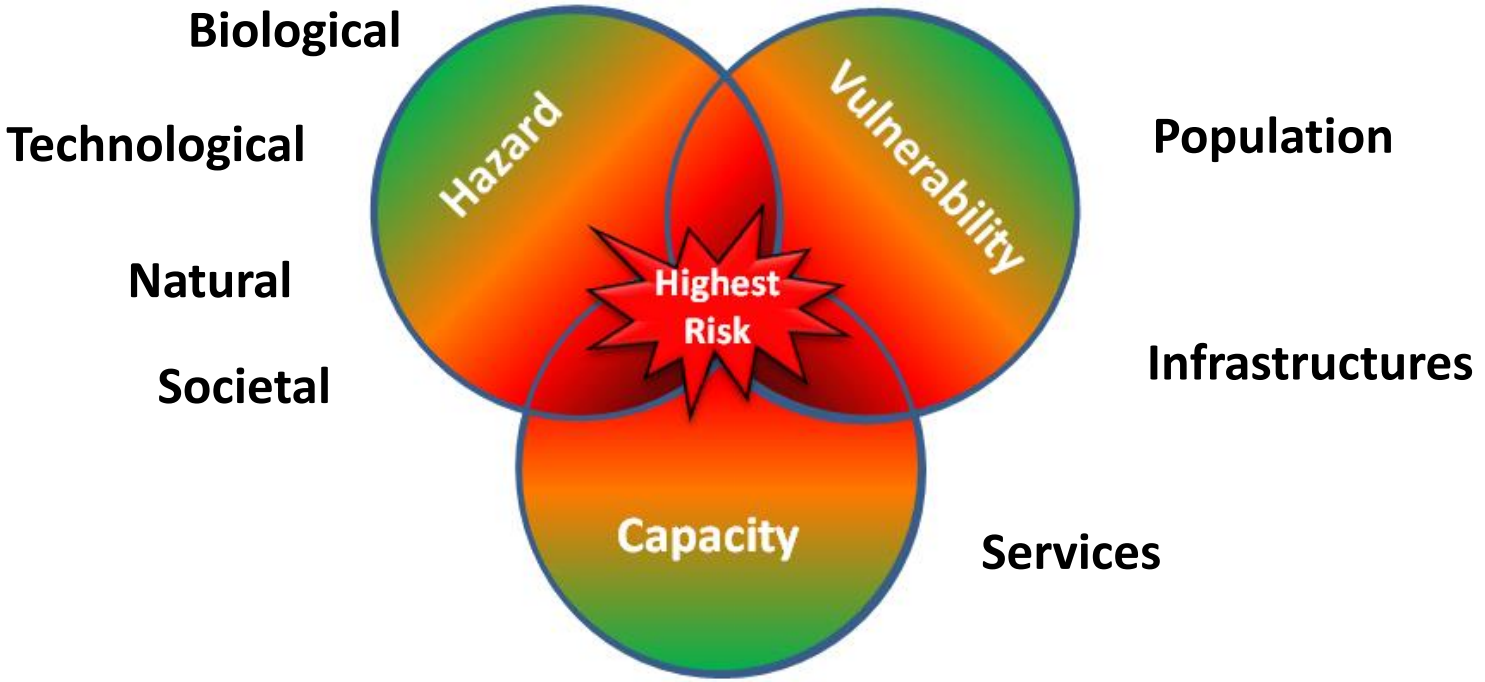
"The art and science of preventing disease, prolonging life and promoting health through the organized efforts of society" [2]

The three main functions of public health are:

- **Risk assessment** - The assessment and monitoring of the health of communities and populations at risk to identify health problems and priorities
- **Policy development** - The formulation of public health policies designed to solve identified health problems and priorities
- **Assurance of services** – To ensure that all populations have access to quality, timely, and cost-effective care

1 http://www.euro.who.int/__data/assets/pdf_file/0007/152683/e95877.pdf
2 Acheson, 1988; WHO: http://www.euro.who.int/en/health-topics/Health-systems/public-health-services

Risk Assessment



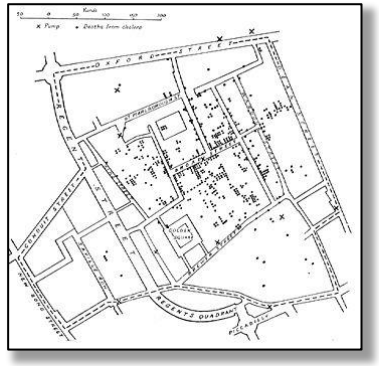
- The populations, infrastructures and services most at risk to experience losses or damages are located in geographic areas where the hazard and vulnerability are the highest and capacity the lowest.
- **There is a strong geographic dimension to risk and its assessment**

Risk Assessment

2

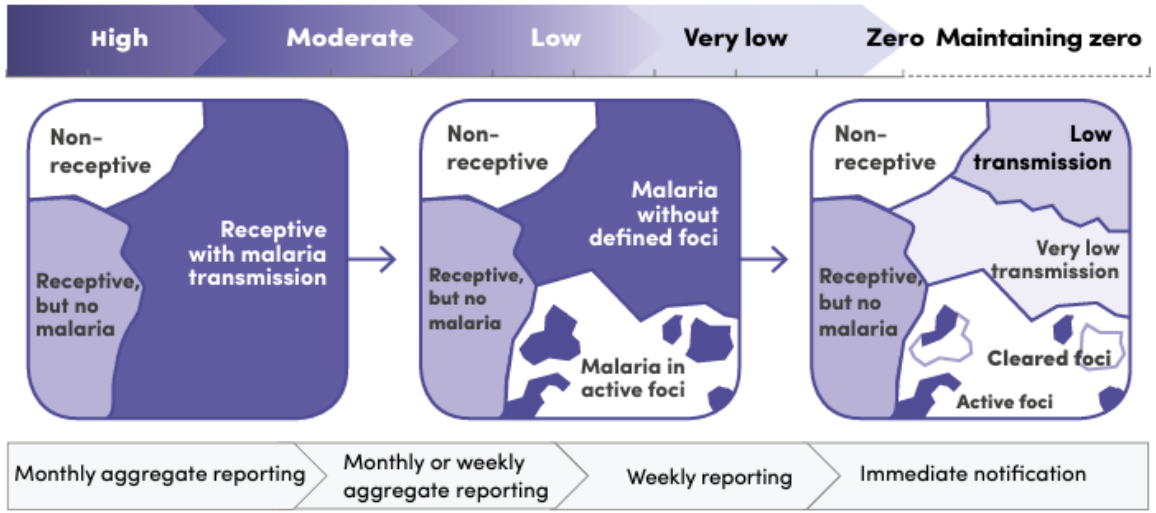
At the origin of modern epidemiology

"Study of the relationship between diseases and the factors likely to influence their frequency, **distribution** and evolution. " [1]



John Snow's original map showing clusters of cholera cases during the London epidemic of 1854.

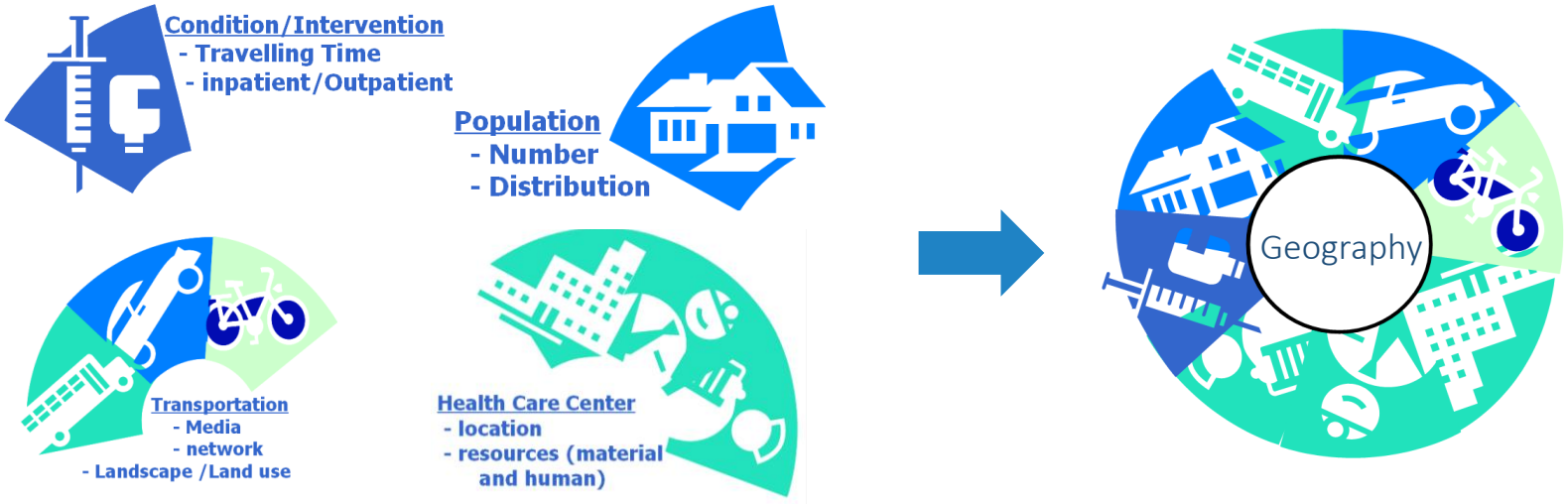
2



The evolution of the geographical granularity of interventions aiming at eliminating communicable diseases like malaria demonstrates the importance of this dimension in epidemiology

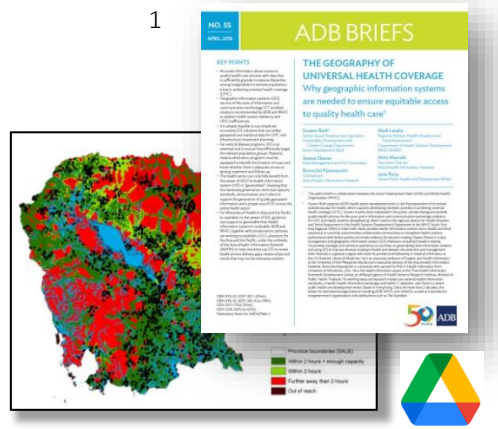
1. https://dictionnaire.lerobert.com/google-dictionnaire-fr?param=%C3%A9pid%C3%A9miologie
2. https://iris.who.int/bitstream/handle/10665/272284/9789241565578-eng.pdf?sequence=1

Assurance of services



- Physical (geographical) access to health care is influenced by the location of the health services, the spatial distribution of the population and the environment between the two
  - A strong geographic aspect to the assurance of services
    - Allows a more comprehensive and systemic approach to Universal Health Coverage (UHC)

1



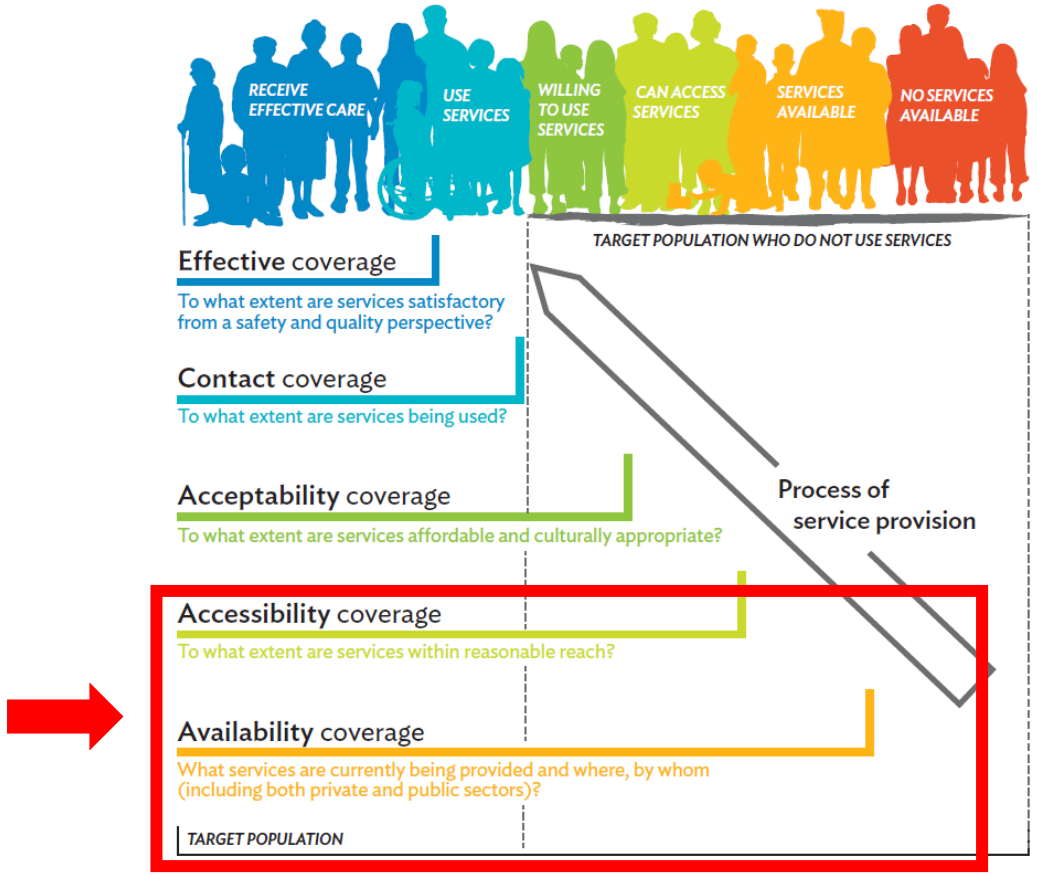
2

1. https://www.adb.org/publications/geography-universal-health-coverage
2. APMEN tech talk https://www.youtube.com/watch?v=pTsJJKCkFJQ

Assurance of services

"Universal Health Coverage means that all individuals and communities receive the health services they need without suffering financial hardship."[1]

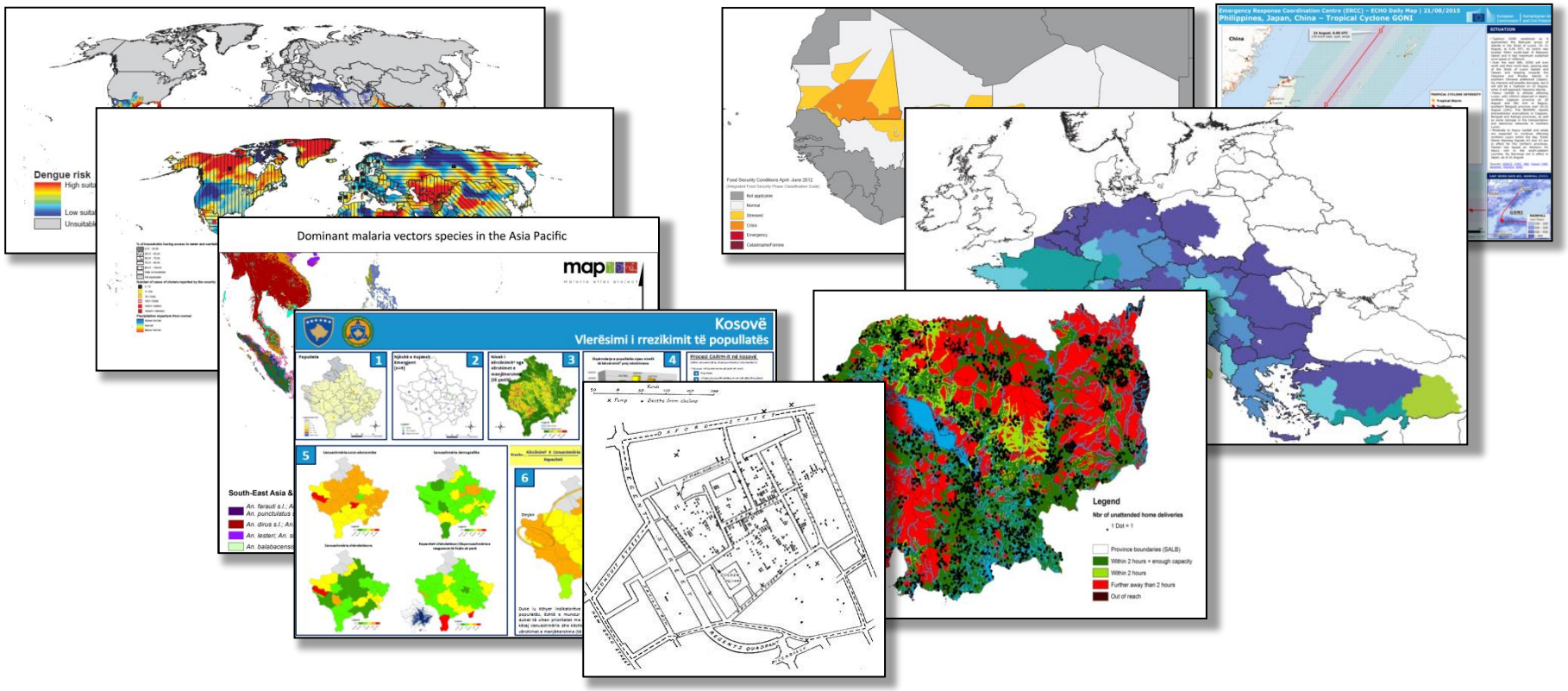
- Equitable access to quality health care is mediated by a number of factors that stand between the availability of services and actual effective service usage or coverage
- The Tanahashi framework can be used to analyze health service coverage
- The first three levels of this framework have a strong geographic dimension.



Tanahashi framework (1978) [2]

1. https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-(uhc)
2. https://www.adb.org/publications/geography-universal-health-coverage

Policy development



- A map is a powerful media to visualize and analyze the spatial distribution of public health related issues at this at all levels.
- Support informed decision making and policy development

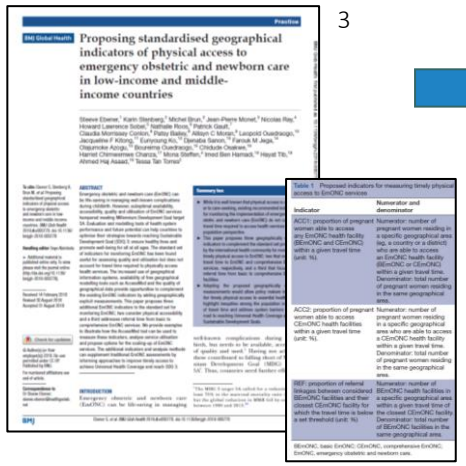
Policy development – Reference indicators

2015 *2019* *2020* *2021*

1

2

3



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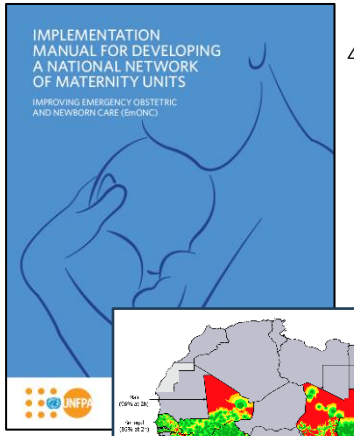
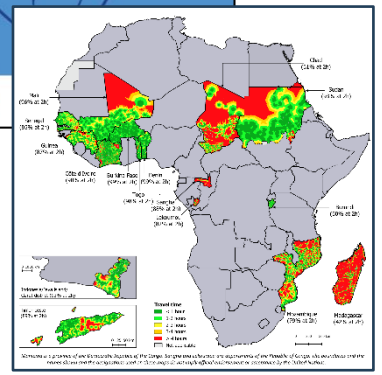




2017- 2023

5

Indicator used for policy formulation

1. https://www.accessmod.org/
2. https://ij-healthgeographics.biomedcentral.com/articles/10.1186/s12942-015-0012-x
3. https://gh.bmj.com/content/4/Suppl_5/e000778.info
4. https://www.unfpa.org/featured-publication/implementation-manual-developing-national-network-maternity-units
5. https://www.who.int/publications/i/item/9789240040519

To summarize

- Geography plays a key role in public health by offering :
  - A neutral “platform” for the integration, visualization, and analysis of data coming from different sources
  - A “tool” to support geographically-based decision making and therefore a more systemic and systematic approach to solving public health challenges
- Geography is an important dimension that should be captured in any health-related information system

Geospatial data and technologies

Geospatial data

Also referred to as spatial data, information about the locations and shapes of geographic features and the relationships between them, usually stored as coordinates and topology.

➡ Digital representation of geography (content)

Geospatial technologies

Refers to equipment used in visualization, measurement, and analysis of earth's features, typically involving such systems as Global Navigation Satellite System (GNSS), Geographical Information Systems (GIS), remote sensing (RS) and new emerging technologies like Common Geo-Registries (CGR)

➡ Tools used to visualize, analyse and/or model geography and geographic phenomena in a digital form

➡ Contributes to the digitalization of the health system

The most important use cases of geospatial data and technologies in public health

1. **Planning:** Estimating population coverage, expanding the network of health facilities, optimizing routes
2. **Communicable/vector-borne diseases:** Risk mapping, microplanning, estimating population movements, identifying potential areas of reinfection, surveillance, monitoring, investigation and management of outbreaks,...
3. **Immunization :** Microplanning, campaign monitoring, disease surveillance, immunization coverage modelling,...
4. **Emergency Management:** Hazard and risk assessment/reduction, early warning, rapid initial assessment, response management, reconstruction planning,...

5 main applications supporting these use cases: Georeferenced master lists, thematic mapping, population estimation and spatial distribution, geographic accessibility modelling, GNSS navigation and tracking

Potential of geospatial data and technologies in public health

Health system challenges (WHO classification) [3]

1 Information

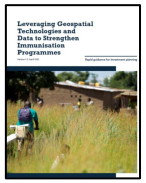
- 1.1 Lack of population denominator
- 1.2 Late reporting of events
- 1.3 Lack of quality/reliable data
- 1.5 Lack of access to information or data
- 1.6 Insufficient utilization of data and information
- 1.7 Lack of a unique identifier

2 Availability

- 2.1 Insufficient supply of commodities
- 2.2 Insufficient supply of services
- 2.3 Insufficient supply of equipment
- 2.4 Insufficient supply of qualified health workers

1

2



Applications of geospatial data and technologies

- Georeferenced Master Lists
- Population estimation and spatial distribution
- Geographic accessibility, service localization, and route optimization modeling
- Thematic mapping
- Navigation, tracking and geographic coordinate collection using a GNSS

3 Quality

- 3.6 Inadequate supportive supervision

5 Utilization

- 5.1 Low demand for services
- 5.2 Geographic inaccessibility

6 Efficiency

- 6.2 Lack of or inappropriate referrals
- 6.3 Poor planning and coordination
- 6.4 Delayed provision of care
- 6.5 Inadequate access to transportation

7 Costs

- 7.2 Lack of effective resource allocation

8 Accountability

- 8.3 Absence of a Community feedback mechanism
- 8.5 Poor accountability between the levels of the health sector
- 8.6 Inadequate understanding of the beneficiary population

1. https://drive.google.com/file/d/1jj779zww4herWOESAd9mXqVE1YfQehtH/view?usp=sharing
2. https://www.gavi.org/news/document-library/leveraging-geospatial-technologies-and-data-strengthen-immunisation
3. https://iris.who.int/bitstream/handle/10665/260480/WHO-RHR-18.06-eng.pdf

Georeferenced master lists

Unique, authoritative, officially curated by the mandated agency, complete, up-to-date and uniquely coded list of all the active (and past active) records for a given type of geographic feature/object (e.g. health facilities, administrative units, villages)

The information that allows to do the following for each of the records in the master list:

- Uniquely identify (unique identifier, name)
- Classify (type, ownership,…)
- Locate (address, administrative division, geographic coordinates)
- When it applies, contact (head name, phone number, email address,…)

Example for health facilities

Unique ID	Health facility name
HF0013	San Juan Referral Hospital

Health facility type	Owernship
Referral Hospital	Government

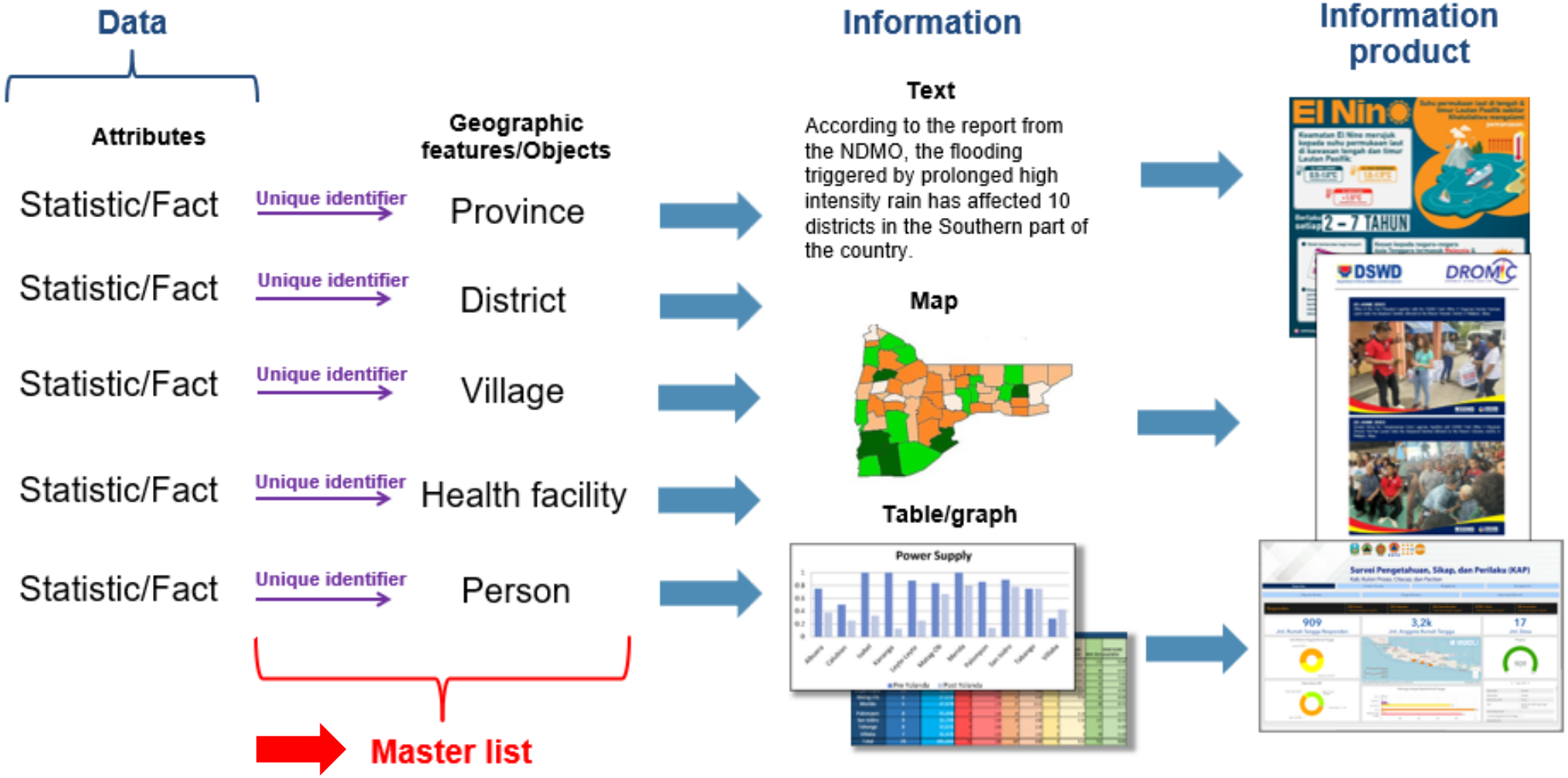
Address	Province code	Province Name	Latitude	Longitude
20, St Andreas Street	TLK01	Andustar	14.412830	121.033090

Head name	Head position	Phone number
Horm Mada	Director	+99 97 11477917

Any other data element is to be considered programmatic attributes and managed outside the master list

Georeferenced master lists – Role

Their place in the data to information products continuum



Georeferenced master lists – Role

They play a key role to ensure data quality across the 6 dimensions of data quality and this for both statistical and spatial data

Data quality dimension	The role of the master list is to ensure that:
Completeness	there are no data gaps
Uniqueness	there are no duplicates
Timeliness	the data represent the reality for each considered point in time
Validity	the syntax of the data element is respected across sources (format, name,…)
Accuracy	The data correctly describe the “real world” feature or event being described
Consistency	data is interoperable between sources

- Reduce duplication of efforts and therefore cost by maintaining only one list instead of several ones
- Support data interoperability and collaboration across partners as well as promote innovation and data use
- Provide the denominator for the implementation of any programs or intervention

Georeferenced master lists – Examples (Philippines)

Master list of administrative units of the Philippines maintained by the Philippine Statistics Authority (PSA)

Released quarterly down to the 4th subnational level (42,001 Barangays as of 31 December 2023)

Master list of health facilities in the Philippines maintained by the Department of Health (DOH)

Updated on a regular basis (40,328 health facilities as of 01 April 2024)

Master list

	10-digit PSGC	Name	Correspondence Code	Geographic Level
2	**0100000000**	**Region I (Ilocos Region)**	**010000000**	**Reg**
3	**0102800000**	**Ilocos Norte**	**012800000**	**Prov**
4	**0102801000**	**Adams**	**012801000**	**Mun**
5	0102801001	Adams	012801001	Bgy
6	**0102802000**	**Bacarra**		
7	0102802001	Bani		
8	0102802002	Buyon		
9	0102802003	Cabaruan		
10	0102802004	Cabulalaan		
11	0102802005	Cabusligan		
12	0102802006	Cadaratan		
13	0102802007	Calioet-Libong		
14	0102802008	Casilian		
15	0102802009	Corocor		

Summary of changes

REPUBLIC OF THE PHILIPPINES
PHILIPPINE STATISTICS AUTHORITY

SUMMARY OF CHANGES MADE IN THE PHILIPPINE STANDARD GEOGRAPHIC CODE SINCE 2001

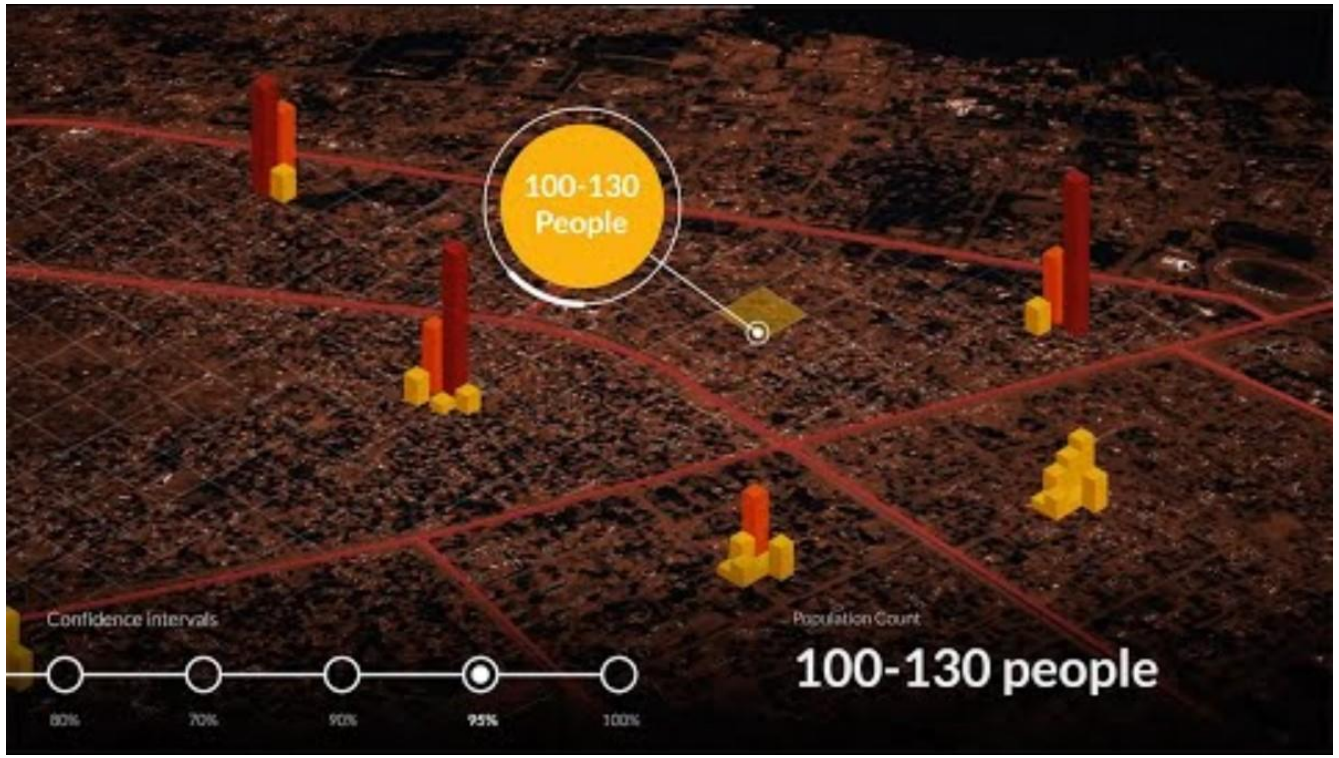
January - March 2001 Updates

Region/Province/Municipal/Bgy. Name	Unit Type	New Code	Mother Unit/Old Name	Old Code	Description/Legal basis
Province of Zamboanga Sibugay, Region IX	Newly created province	098300000			RA 8973
Municipality of Alicia, Zamboanga Sibugay	Transferred Municipality	098301000	Zamboanga del Sur	097301000	RA 8973
Municipality of Buug, Zamboanga Sibugay	Transferred Municipality	098302000	Zamboanga del Sur	097304000	RA 8973
Municipality of Diplahan, Zamboanga Sibugay	Transferred Municipality	098303000	Zamboanga del Sur	097339000	RA 8973
Municipality of Imelda, Zamboanga Sibugay	Transferred Municipality	098304000	Zamboanga del Sur	097336000	RA 8973
Municipality of Ipil, Zamboanga Sibugay	Transferred Municipality	098305000	Zamboanga del Sur	097309000	RA 8973
Municipality of Kabasalan, Zamboanga Sibugay	Transferred Municipality	098306000	Zamboanga del Sur	097310000	RA 8973
Municipality of Mabuhay, Zamboanga Sibugay	Transferred Municipality	098307000	Zamboanga del Sur	097314000	RA 8973
Municipality of Malangas, Zamboanga Sibugay	Transferred Municipality	098308000	Zamboanga del Sur	097316000	RA 8973
Municipality of Naga, Zamboanga Sibugay	Transferred Municipality	098309000	Zamboanga del Sur	097320000	RA 8973
Municipality of Olutanga, Zamboanga Sibugay	Transferred Municipality	098310000	Zamboanga del Sur	097321000	RA 8973
Municipality of Payao, Zamboanga Sibugay	Transferred Municipality	098311000	Zamboanga del Sur	097335000	RA 8973
Municipality of Roseller Lim, Zamboanga Sibugay	Transferred Municipality	098312000	Zamboanga del Sur	097342000	RA 8973
Municipality of Siay, Zamboanga Sibugay	Transferred Municipality	098313000	Zamboanga del Sur	097326000	RA 8973
Municipality of Talusan, Zamboanga Sibugay	Transferred Municipality	098314000	Zamboanga del Sur	097334000	RA 8973
Municipality of Titay, Zamboanga Sibugay	Transferred Municipality	098315000	Zamboanga del Sur	097329000	RA 8973
Municipality of Tungawan, Zamboanga Sibugay	Transferred Municipality	098316000	Zamboanga del Sur	097331000	RA 8973

	Health Facility Code	Health Facility Code Short	Facility Name	Facility Major Type	Health Facility Type	Ownership Major Classification	Ownership Sub-Classification for Government facilities
2	DOH0000000000047902	47902	A.E. PACIO QUALIHEALTH MEDICAL CLINIC AND LABORATORY	Health Facility	General Clinical Laboratory	Private	
3	DOH0000000000047962	47962	A.G.S. DIAGNOSTIC & DRUG TESTING LABORATORY	Health Facility	General Clinical Laboratory	Private	
4	DOH0000000000005343	5343	AB-ABUT BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
5	DOH0000000000002371	2371	ABACCAN BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
6	DOH0000000000034007	34007	ABANON BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
7	DOH0000000000002667	2667	ABLAN SARAT BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
8	DOH0000000000036878	36878	ABONAGAN BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
9	DOH0000000000034093	34093	ABOT-MOLINA BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
10	DOH0000000000046041	46041	ABUOR BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	
11	DOH0000000000012711	12711	ABUT BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
12	DOH0000000000013909	13909	ACAO BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
13	DOH0000000000048879	48879	ACCU HEALTH DIAGNOSTICS	Health Facility	General Clinical Laboratory	Private	
14	DOH0000000000047903	47903	ACCULIFE MEDICAL LABORATORY	Health Facility	General Clinical Laboratory	Private	
15	DOH0000000000047985	47985	ACCURA-TECH DIAGNOSTIC LABORATORY	Health Facility	Drug Testing Laboratory	Private	
16	DOH0000000000025981	25981	ACNAM BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
17	DOH0000000000011713	11713	ACOP BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
18	DOH0000000000047984	47984	ACULAB DRUG TESTING CENTER	Health Facility	Drug Testing Laboratory	Private	
19	DOH0000000000004172	4172	ADAMS MUNICIPAL HEALTH OFFICE	Health Facility	Rural Health Unit	Government	Local Government Unit
20	DOH0000000000032212	32212	ADAMS RURAL HEALTH UNIT BIRTHING FACILITY	Health Facility	Birthing Home	Government	
21	DOH0000000000003019	3019	AG-AGRAO BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
22	DOH0000000000029922	29922	AG-AGUMAN BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
23	DOH0000000000017784	17784	AGAGA BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
24	DOH0000000000036465	36465	AGAT BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
25	DOH0000000000036890	36890	AGDAO BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
26	DOH0000000000036606	36606	AGGAY BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit
27	DOH0000000000036829	36829	AGNO BARANGAY HEALTH STATION	Health Facility	Barangay Health Station	Government	Local Government Unit

Population estimation and spatial distribution

Use of statistical models, remote sensing datasets, and sampled census or household survey information to create spatially accurate estimates of population density and distribution, often including age and sex disaggregation

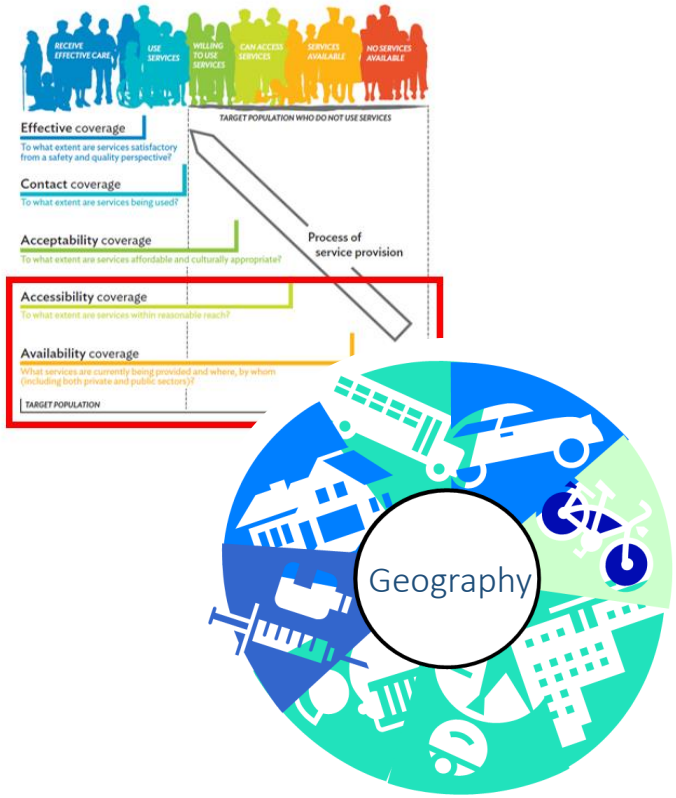


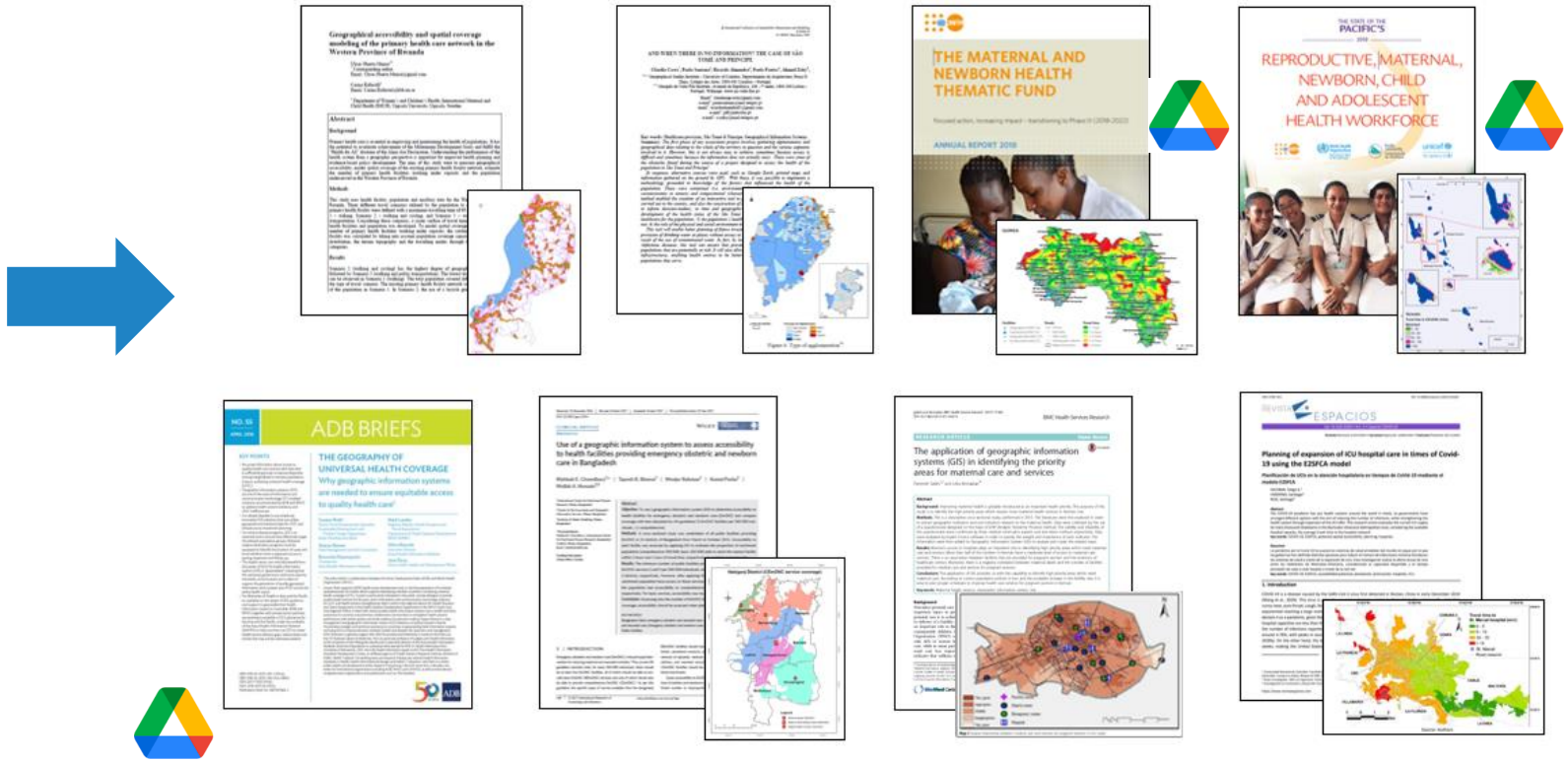
https://www.youtube.com/watch?v=Z1XrHOt8w2A&t=8s

Geographic accessibility, service localization, and route optimization modeling

Advanced modelling approaches that help programs, and microplanning teams, assess and improve the planning, allocation and delivery of resources

Geographic accessibility, service localization



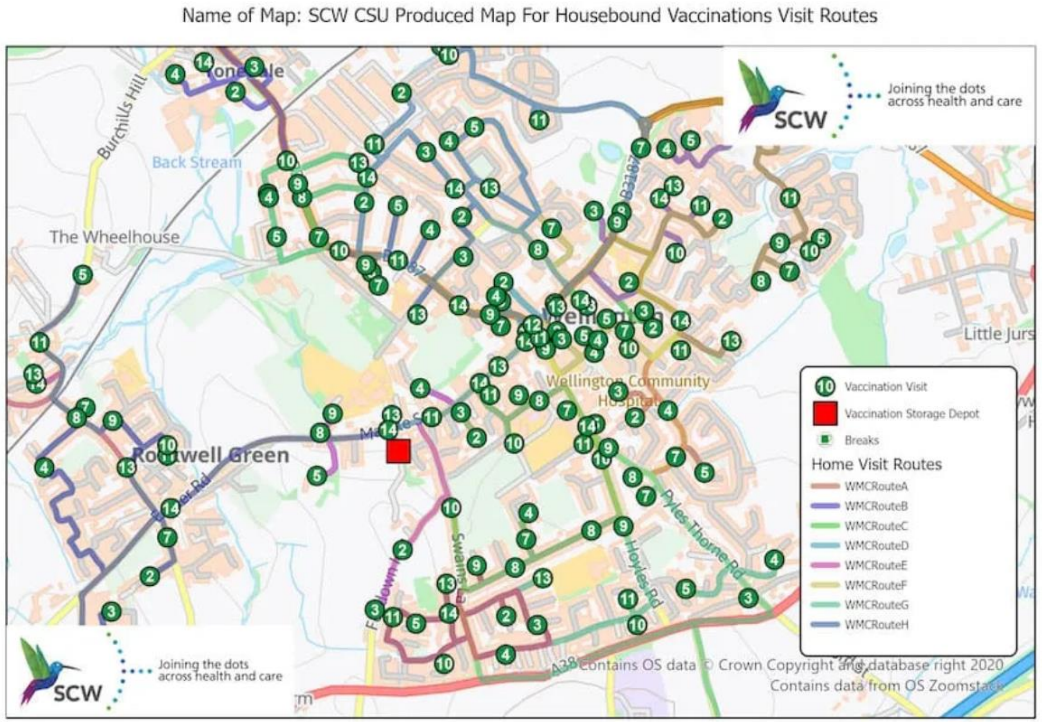


Increasing bibliography on this topic, including in relation to COVID-19

Geographic accessibility, service localization, and route optimization modeling

Route optimization modeling

Use of algorithms to calculate optimal routes based on various factors such as traffic flow, distance, travel time, vehicle types and other use-defined parameters to generate the most efficient route for a given scenario

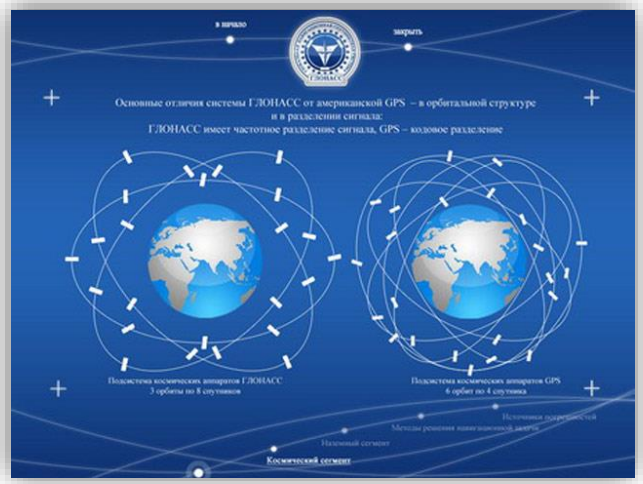


Benefits:

1. Cost efficiency (reduce fuel consumption, maintenance costs, operational expenses)
2. Time saving (on-time delivery)
3. Improved resource allocation (vehicles, personnel and time)
4. Environmental sustainability (reduce carbon emissions)

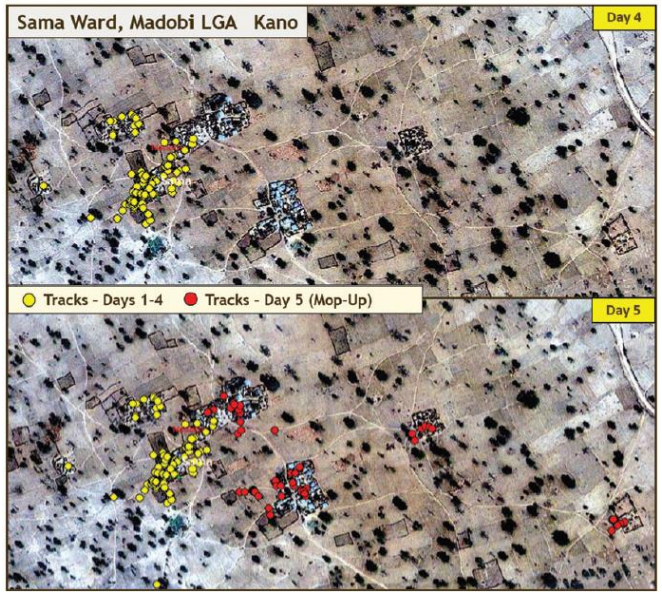
Navigation, tracking and geographic coordinate collection using a GNSS

Use of a Global Navigation Satellite System (GNSS) enabled device to get to a particular location (navigate), track movements or collect geographic coordinates (latitude, longitudes) in the field



Global Navigation Satellite System (GNSS)

Navigation



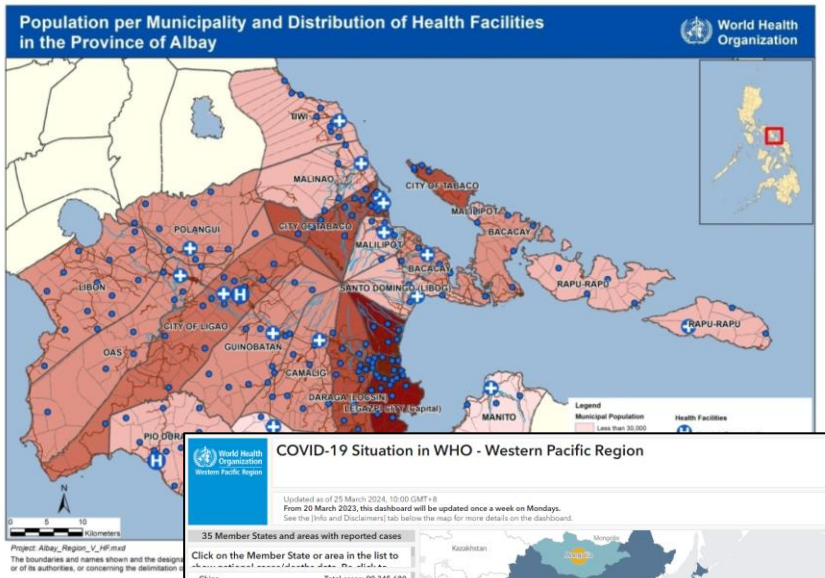
Tracking to support Polio eradication in Nigeria [1]

Collection of geographic coordinates in the field

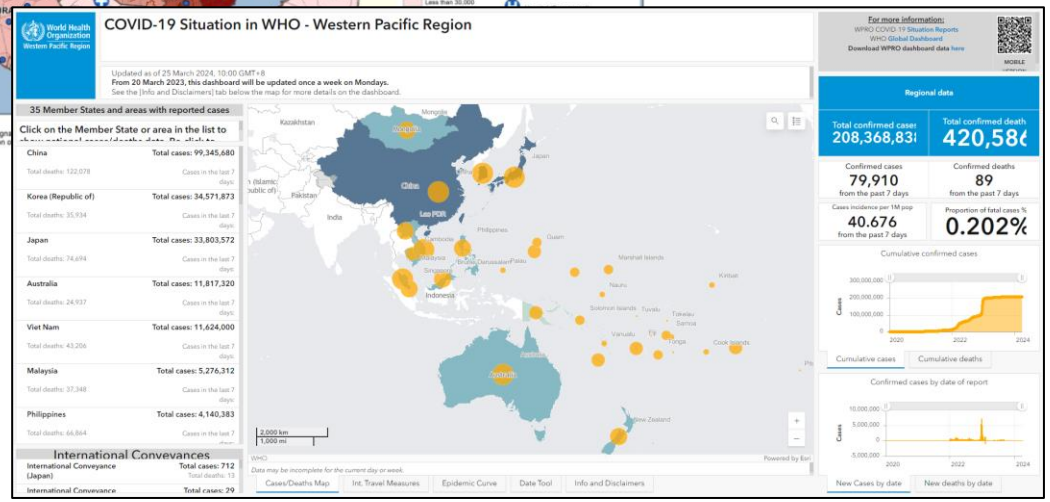
1. https://www.researchgate.net/publication/266945980_Improving_Polio_Vaccination_Coverage_in_Nigeria_Through_the_Use_of_Geographic_Information_System_Technology/figures?lo=1)

Thematic mapping

Creation of thematic maps designed to convey information about a single topic or theme, such as population density or health



Static map

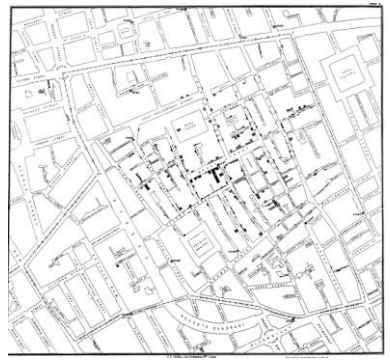


Dynamic map as part of a dashboard

Most used capability of a GIS software to portray the geographic distribution of one or more phenomena.

Involves the use of colors and/or symbols to visualize selected properties of geographic features.

Used in public health for a very long time for visualizing and analyzing health-related Phenomena.



John Snow's cholera map in London (published in 1854)

Short break

10 min

Geo-enabling the Health Information System, programs or interventions training workshop for Asia Pacific

...and beyond

Session 2: Examples of application of geospatial data and technologies in public health

Planning - Accessibility analysis (Vanuatu)

Objective

Ensure that the population has equitable geographic access to primary health care services

Method

- Data compilation, quality assessment and improvement
- Use of AccessMod to conduct different analysis aiming at evaluating the current level of accessibility of primary health care services, service referral and propose solutions for scaling up
- Technical capacity strengthening

Reference:
https://healthgeolab.net/KNOW_REP/Acc_Analysis_VUT_050224_FINAL.pdf

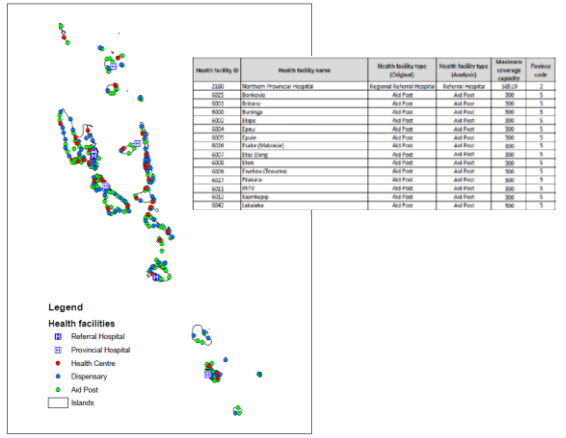
Administrative units

Transportation network

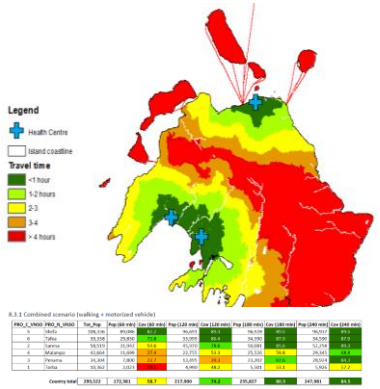
Population

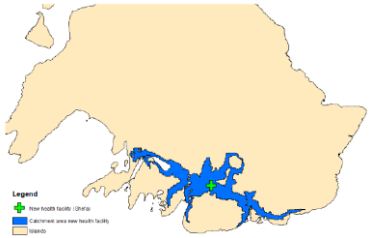
Improved geospatial data that can be used to support other programs

Result

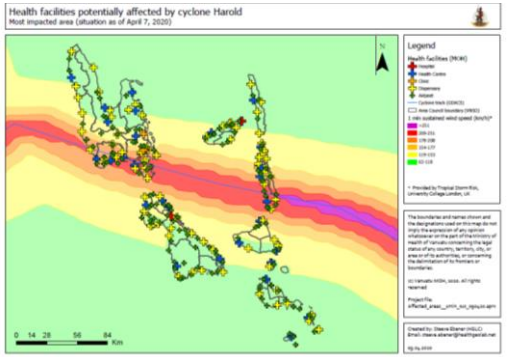


Updated georeferenced master list of health facilities





Accessibility analysis including scaling up scenarios



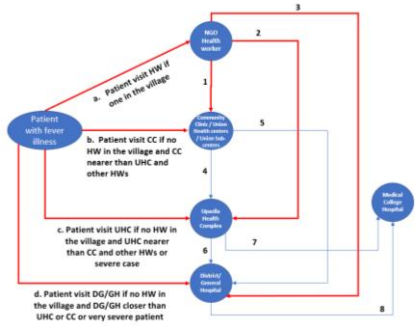
Rapid impact assessment maps to support the response to cyclone Harold 2020

Planning - South and Southeast Asia Community-based Trials Network (SEACTN) (Bangladesh, Cambodia, Lao PDR)

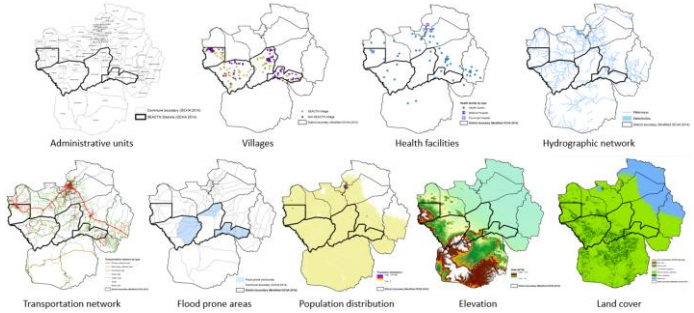
Project implemented by MORU. Objectives of the accessibility analysis component is to guide the implementation of the SEACTN programme by:

- Estimating the proportion of the total population that can physically access the different level of the existing health service delivery network within a given travel time (1, 2, 3 hours);
- Identify areas which are hard to reach and where there is currently no SEACTN village health workers;
- Estimating travel time between each SEACTN village (existing and proposed) and the nearest health facility; and
- Defining the location of potential sites for new health facilities to increase population coverage and reduce the referral time between SEACTN villages and the nearest health facility.

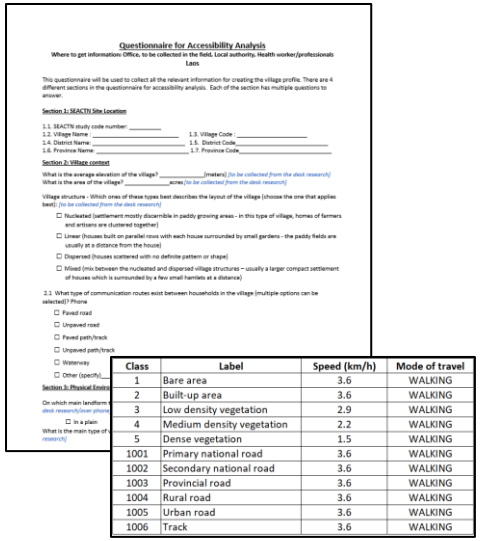
Reference: https://seactn.org/



Understand the referral pathways



Prepare the data for the accessibility analysis



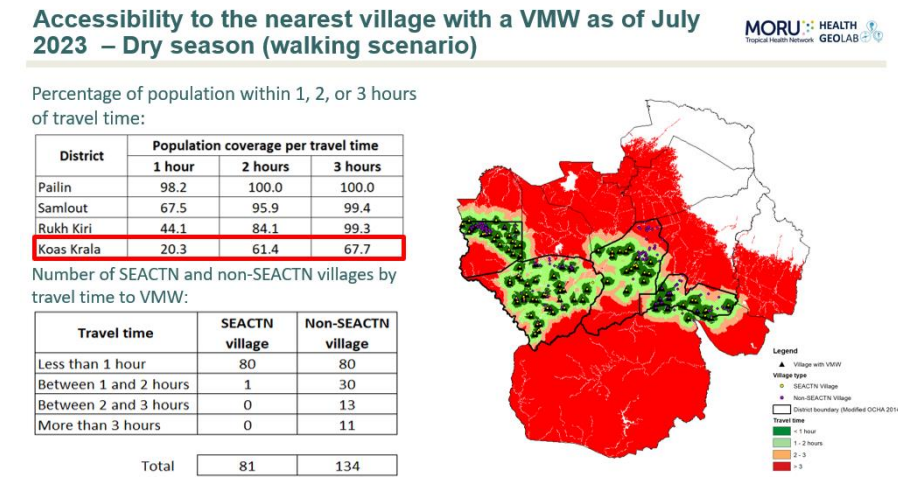
Questionnaire for Accessibility Analysis

Where to get information: Office, to be collected in the field, Local authority, Health worker/professionals

Laos

Class	Label	Speed (km/h)	Mode of travel
1	Bare area	3.6	WALKING
2	Built-up area	3.6	WALKING
3	Low density vegetation	2.9	WALKING
4	Medium density vegetation	2.2	WALKING
5	Dense vegetation	1.5	WALKING
1001	Primary national road	3.6	WALKING
1002	Secondary national road	3.6	WALKING
1003	Provincial road	3.6	WALKING
1004	Rural road	3.6	WALKING
1005	Urban road	3.6	WALKING
1006	Track	3.6	WALKING

Validate travel scenario through village profiling survey



Accessibility to the nearest village with a VMW as of July 2023 – Dry season (walking scenario)

MORU Tropical Health Network HEALTH GEOLAB

Percentage of population within 1, 2, or 3 hours of travel time:

District	Population coverage per travel time		
	1 hour	2 hours	3 hours
Pailin	98.2	100.0	100.0
Samlout	67.5	95.9	99.4
Rukh Kiri	44.1	84.1	99.3
Koas Krala	20.3	61.4	67.7

Number of SEACTN and non-SEACTN villages by travel time to VMW:

Travel time	SEACTN village	Non-SEACTN village
Less than 1 hour	80	80
Between 1 and 2 hours	1	30
Between 2 and 3 hours	0	13
More than 3 hours	0	11
Total	81	134

Conduct the different analysis using AccessMod

Planning - Prioritization of EmONC services (Indonesia)

Objective

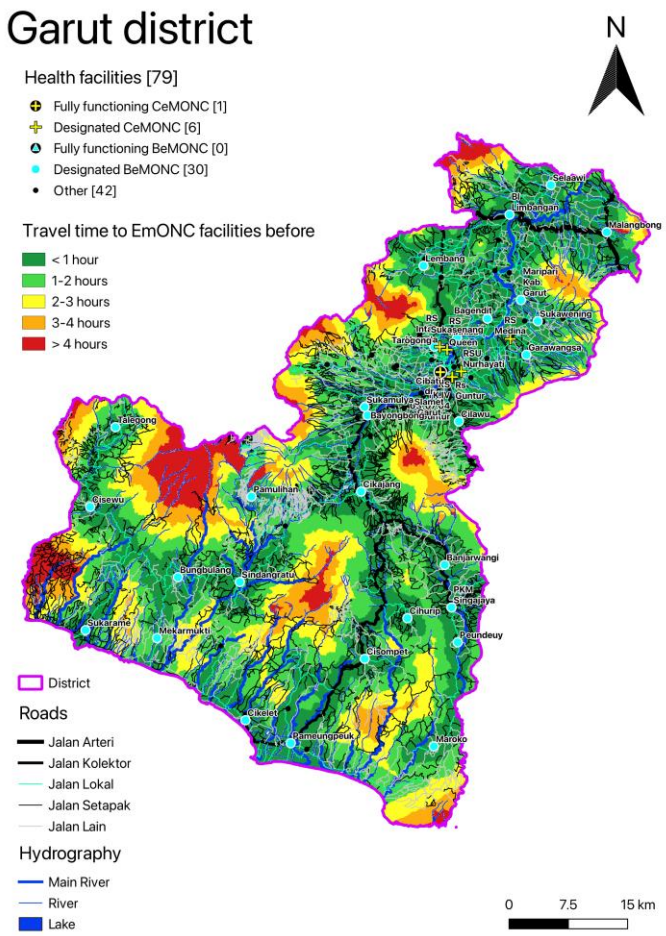
UNFPA has been using GIS-based approach to help countries establish or prioritize their national network of Maternity Units, especially EmONC services

Method

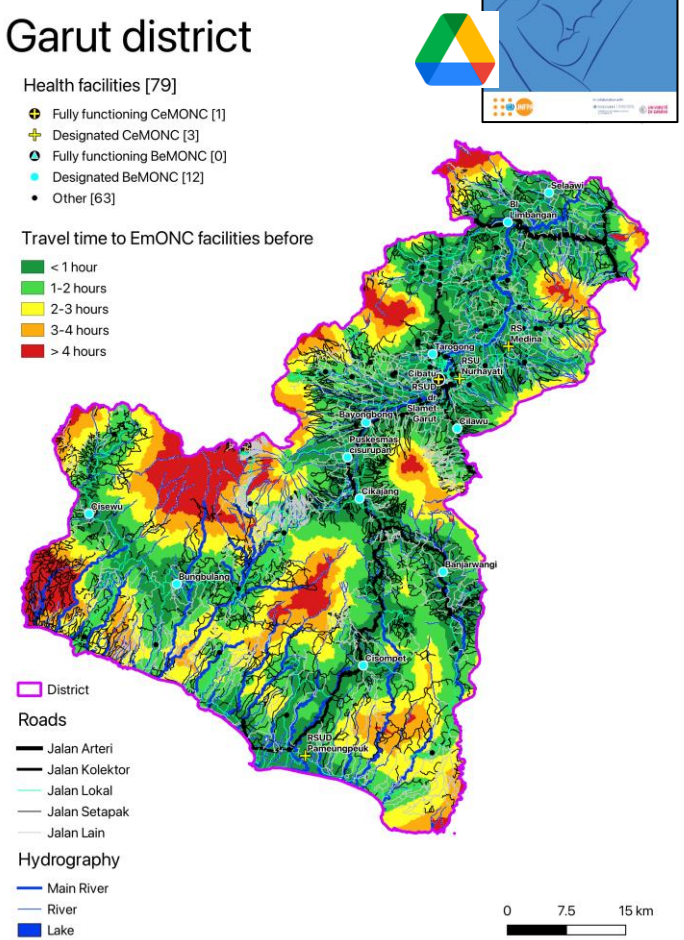
- Data compilation, quality assessment and improvement
- Technical capacity strengthening
- Consultation to define local parameters
- Use of AccessMod to conduct different analysis aiming at evaluating the current level of accessibility of EmONC services and test different scenarios to prioritize health facilities for a cost-effective delivery of services

Reference: https://www.unfpa.org/featured-publication/implementation-manual-developing-national-network-maternity-units

Result



Before prioritization (37 EmONC)
82.5% pop coverage in 1 hour
95% pop coverage in 2 hours



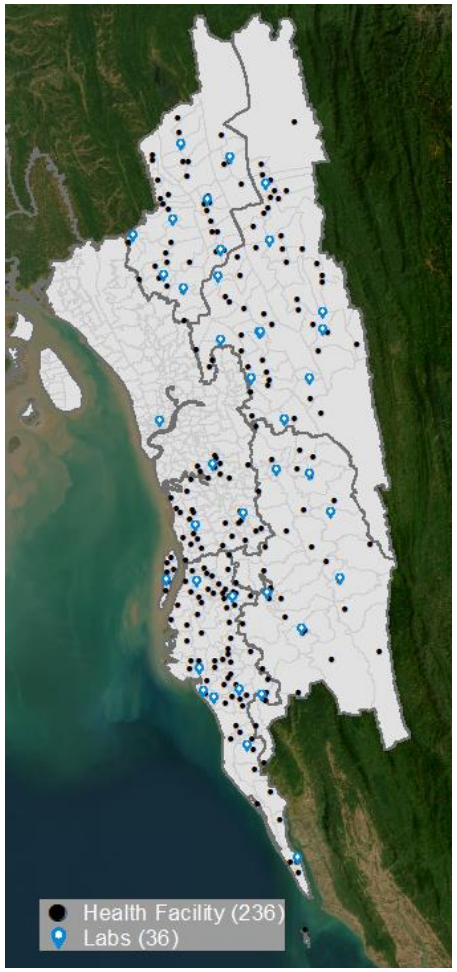
After prioritization (16 EmONC)
77% pop coverage in 1 hour
93% pop coverage in 2 hours

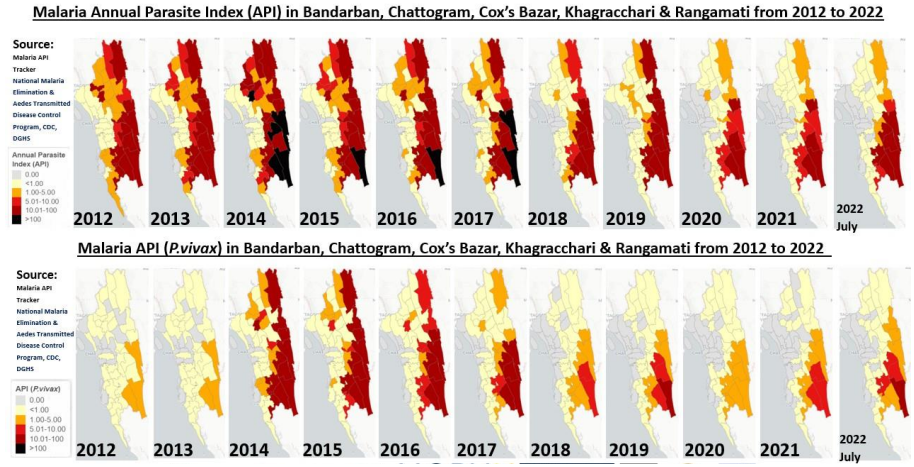
Planning - Diagnostic Network Optimization (DNO) (Bangladesh)

MORU and GroupMappers have been supporting the National Malaria Elimination Programme (NMEP) with the use of the OptiDx tool to model an evidence-based strategy for introducing G6PD diagnosis that best uses available resources to optimise access to testing by P. vivax patients

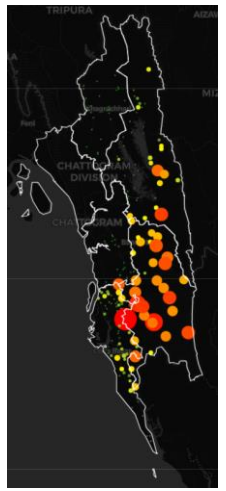
Objectives:

- Assemble a comprehensive geospatial database of:
  - Health system infrastructure
  - P. vivax case loads
  - Economic cost associated with P. vivax disease and case-management in Bangladesh
- Model the coverage and cost of potential scenarios for introducing G6PD testing
- Prepare DNO outputs that can be included into strategic and operational plans and funding proposals by NMEP

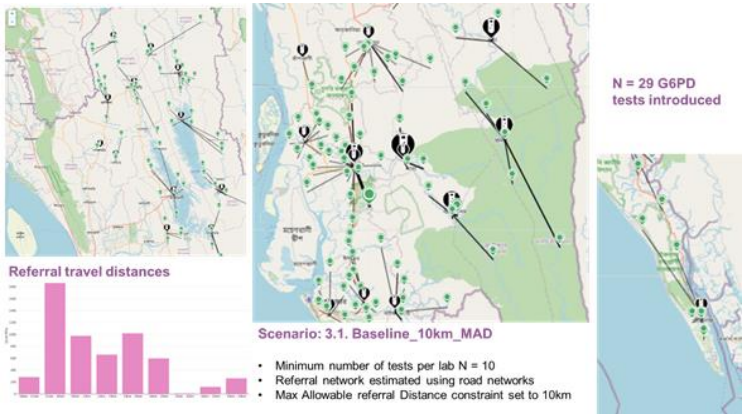




Demand

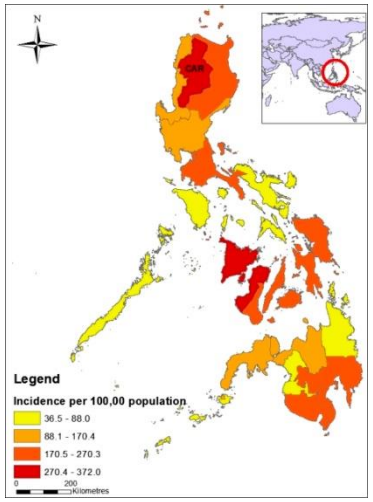


Results



Communicable/Vector-borne diseases - Thematic mapping (Philippines, Lao PDR)

Thematic maps are being used to help visualizing the spread of diseases by different programs in countries

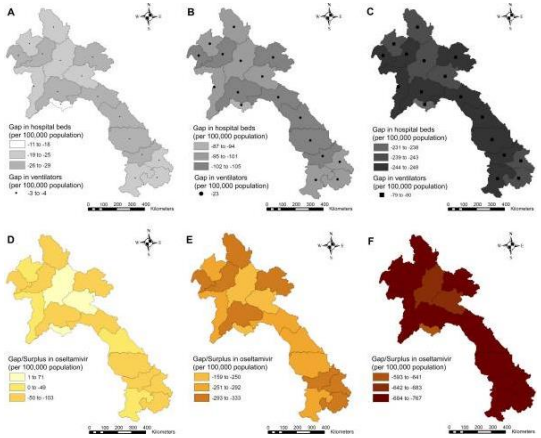


The Philippines has been using thematic maps to look at the distribution of dengue incidence at the subnational level, allowing to identify areas at risk and enables faster mobilization of resources.

Reference: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3335676/pdf/tropmed-86-753.pdf

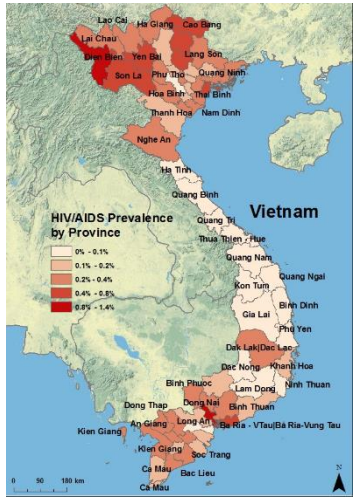
Thematic maps have also been used to support health care planning for pandemic influenza in Lao PDR. By exporting simulation results into GIS software, maps geographical analysis of the distribution of resources.

Reference: Stein *et al. BMC Public Health* **12**: 870 (2012) doi:10.1186/1471-2458-12-870



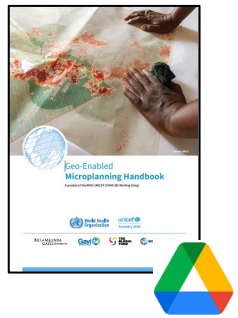
Vietnam has been using thematic maps to show prevalence of HIV/AIDS cases per province , show the correlation of HIV cases with Tuberculosis cases (as TB is one of causes of death among HIV infected people), and the relationship between the increase of infection and number of clinics in certain areas.

Reference: http://sites.tufts.edu/gis/files/2013/11/Wanlund_Anne.pdf

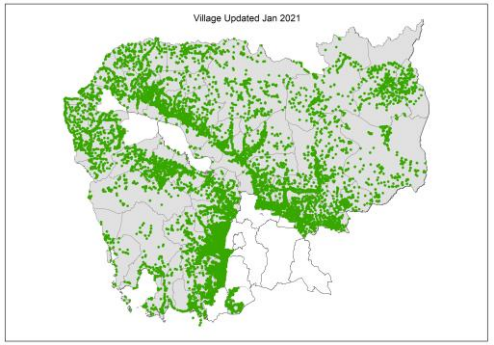


Vector borne diseases - Malaria stratification (Cambodia)

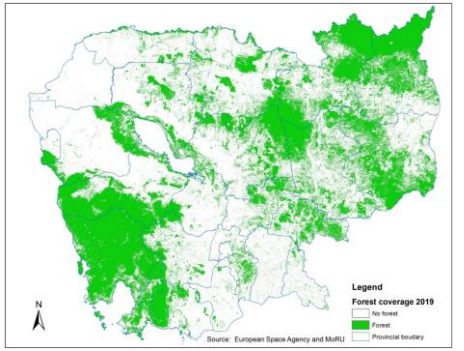
The National Center for Parasitology, Entomology and Malaria Control (CNM) with MORU's support has been working on geo-enabling the microplanning of its malaria programme



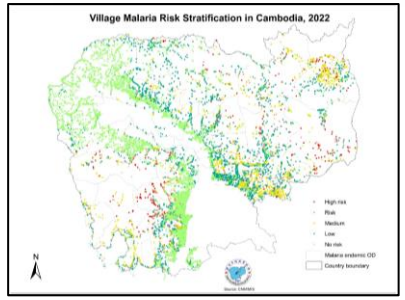
Checking, correcting and updating the list and location of villages and health facilities as well as the boundaries of the Operational Districts for the Malaria endemic areas



ESA analysed imagery using ground truthing data collected by MORU and CNM to generate a new forest cover map



Stratifying malaria risk at the village level based on average reported API, percentage of forest coverage and distance to the nearest health facility using a tool built in the Malaria Information System



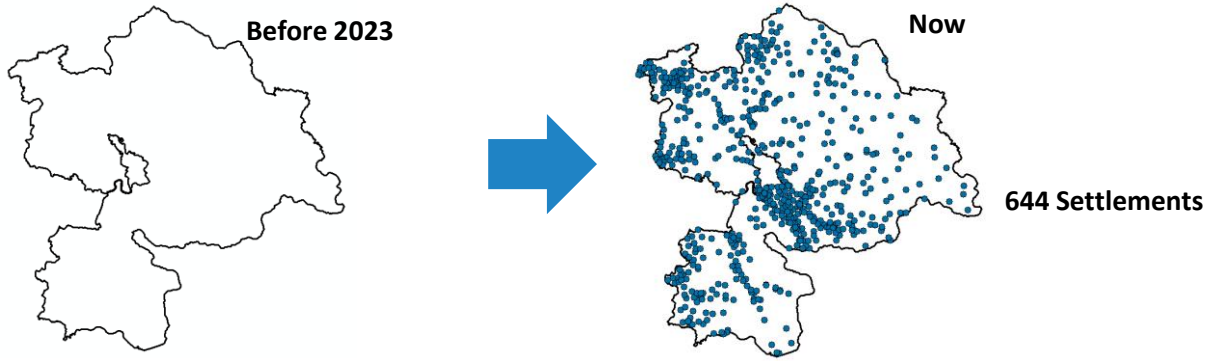
https://www.ajtmh.org/view/journals/ tpmd/95/6_Suppl/article-p97.xml

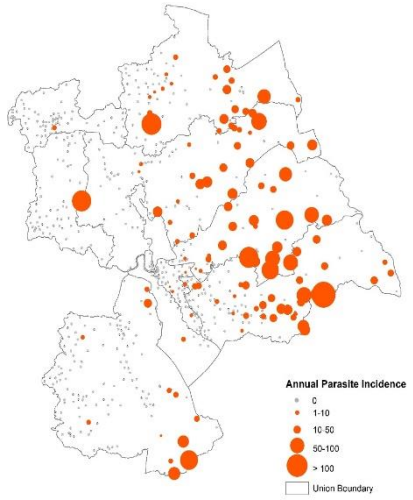
Communicable diseases - Malaria surveillance and risk mapping (Bangladesh)

The National Malaria Elimination Programme (NMEP) with the support of MORU and GroupMappers has been working on increasing the granularity of malaria surveillance and risk mapping

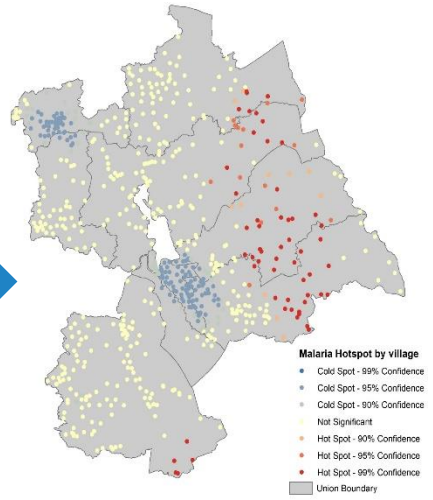
Enhance malaria data by transitioning from the Upazila (sub-district) to the settlement level

- Settlements Mapping
- Health Facilities Mapping
- Digitalized Malaria Data Collection in Bandarban, BD
- Baseline geospatial data for Accessibility Analysis

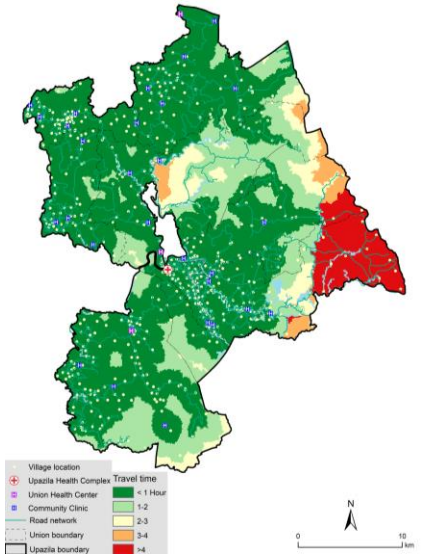




Settlement level API mapping (fine scale malaria risk)



Malaria hotspot map



Physical accessibility modeling

Immunization - Geo-enabled microplanning (Myanmar)

Objective

Use of geospatial data and technologies to support routine immunization microplanning as well as monitoring and evaluation in 49 townships

Method

- Documentation of the routine immunization data ecosystem
- Development of the master list of EPI communities, vaccination points and health facilities
- Technical capacity strengthening
- Collaborative mapping exercise with MOHS staff
- Creation of electronic microplanning maps

Reference: https://bit.ly/3vyUuNL

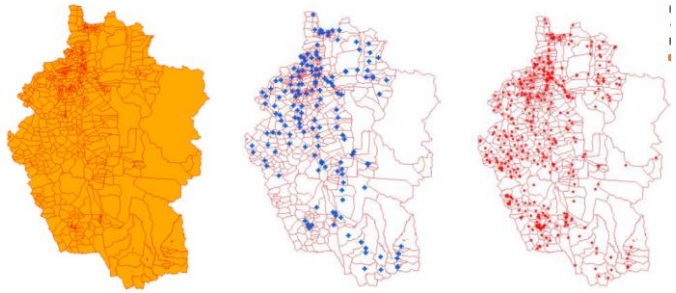
Type	Definition	Population's presence status options
Ward	4th level administrative divisions encountered in urban areas and officially recognized by the GAD	long term
Village	long term settlement officially recognized by the GAD	long term
Army	Settlement managed by the Ministry of Defense	short term, long term, seasonal
Camp	Settlement typically settled for displ population (refugees or internally displaced population for example)	
Workers settlement	Settlement setup by workers to live to their place of work (plantation, factory, building site, mining site...)	
Other settlement	Any other inhabited place not cover by the other definitions	

Population presence classification

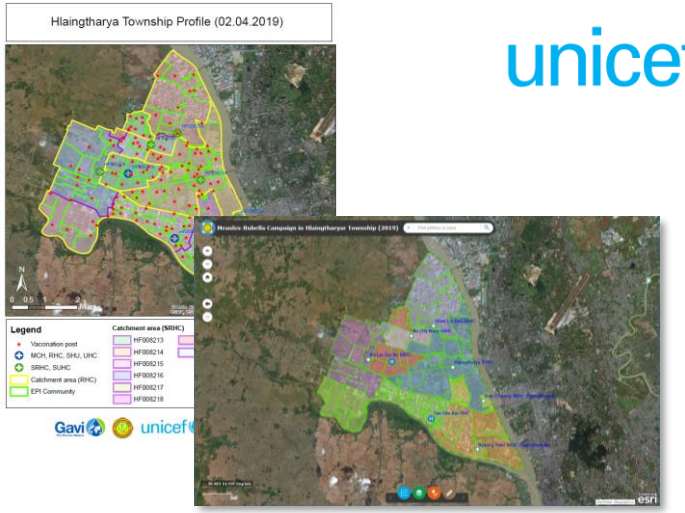
PS_T_EN	Defionition (English)
Short term	Settlement setup for a period shorter than 1 year
Long term	Settlement setup for a period longer than 1 year
Seasonal	Settlement setup temporarily over the same period every year

New classification of EPI communities

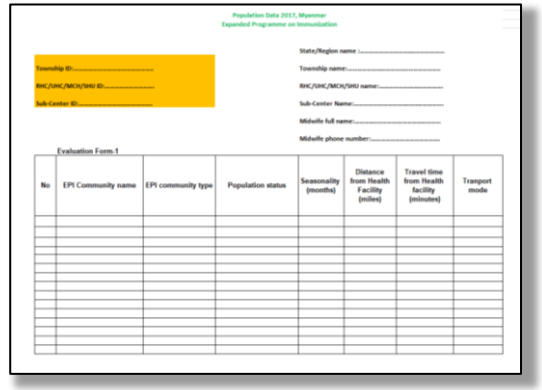
Result



Establish/updated/complete the master list of EPI communities, vaccination posts and health facilities with geographic extent or location



Digital microplanning maps (pdf and online)



Modified routine immunization forms

Immunization - Geo-enabled microplanning (Mozambique)

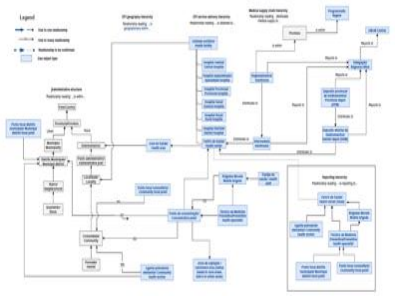
Objective

Geo-enable routine immunization microplanning (implemented in 2 districts and about to be scaled up to another 36 districts)

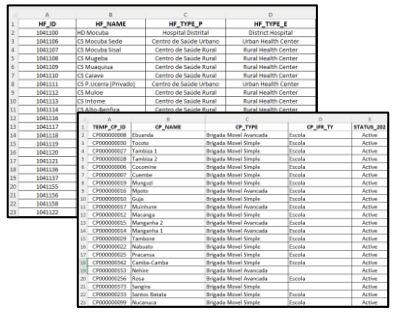
Method

- Documentation of the routine immunization data ecosystem
- Establishment and validation of the master list of health facilities and concentration points
- Technical capacity strengthening and field data collection
- Use of AccessMod to delimitate proximity basins and estimate population coverage
- Creation of electronic microplanning maps
- Deployment of a Common Geo-Registry

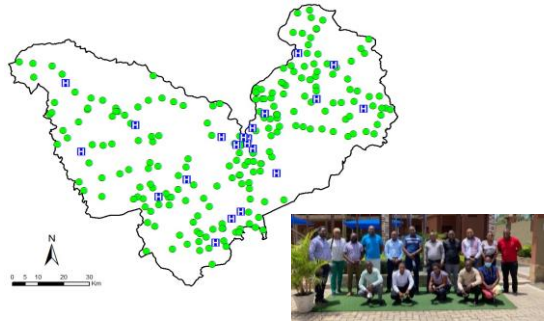
Result



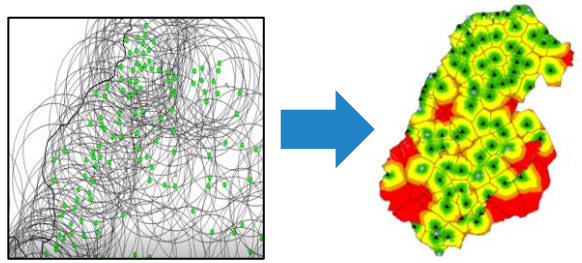
Immunization ecosystem data model



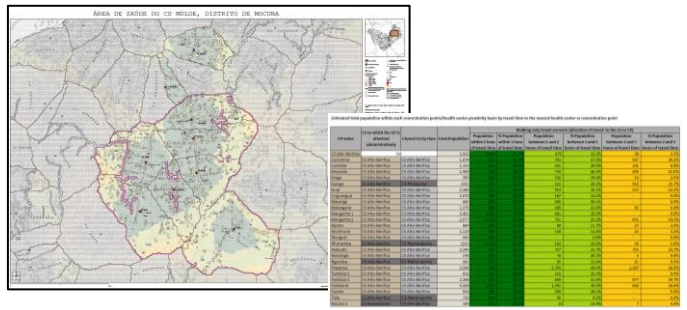
Georeferenced master list of health facilities and concentration points



Field data collection to collect geographic coordinates of health facilities and concentration points



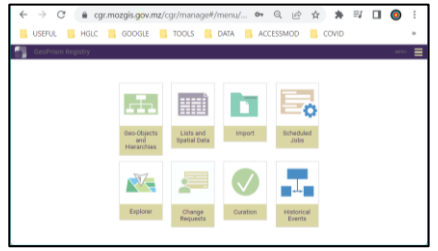
Improved method to estimate population coverage



Microplanning maps and population estimates for the optimization of the concentration point network

Adjustment of the microplanning form

Deployment of the GeoPrism Registry platform (Common Geo-Registry) for the maintenance, regular update and sharing of master list and associated spatial data



Emergency management - Vulnerability and risk analysis (Kosovo, North Macedonia)

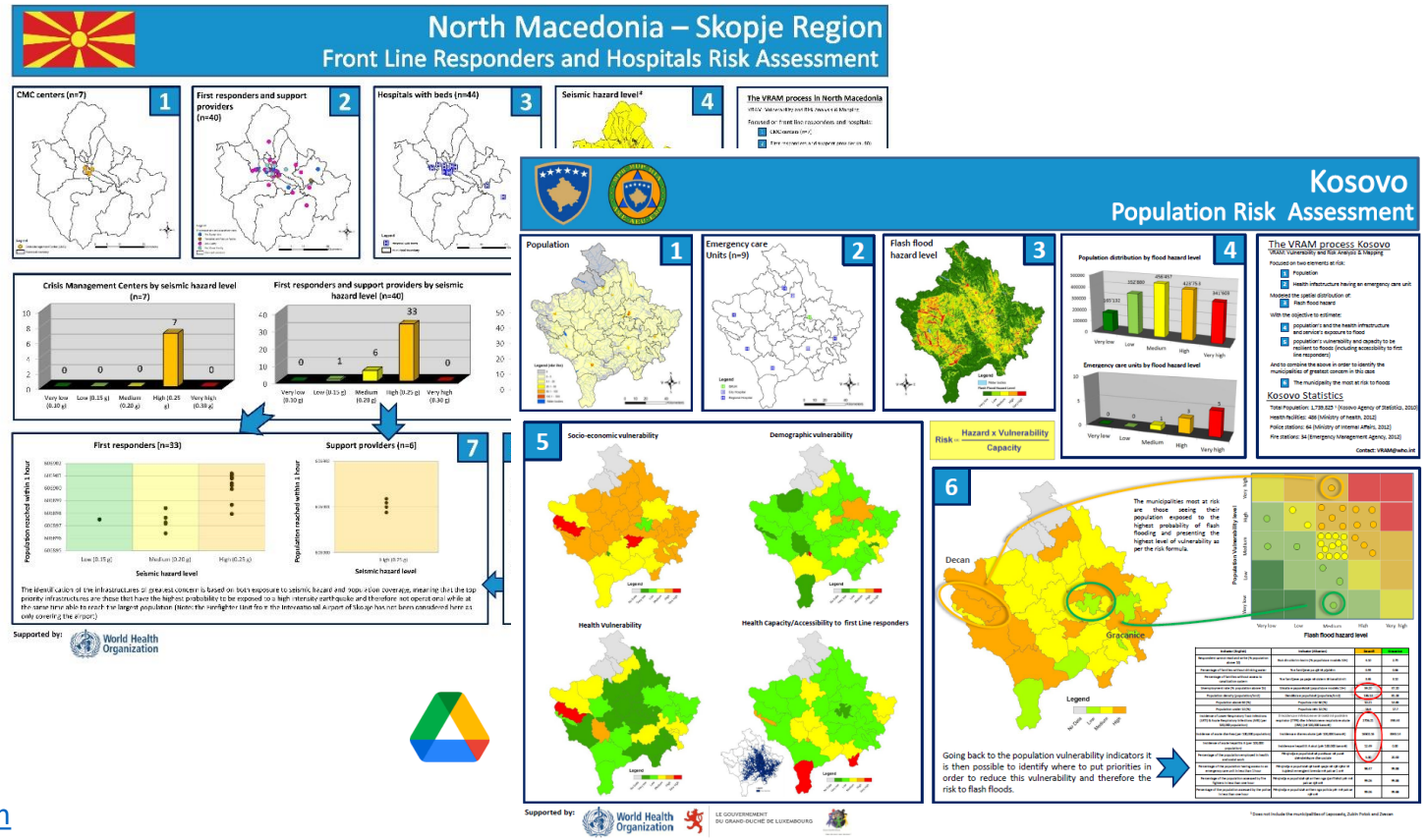
GIS-based methods can be used to conduct geographically-based vulnerability and risk analysis.

The Vulnerability and Risk Analysis & Mapping (VRAM) approach has for example been implemented in different countries (e.g. Kosovo, North Macedonia) to support emergency preparedness of the health sector

Objectives :

- Identify the health facilities and other infrastructures that will most likely not be operational during a disaster
- Identify the geographic area(s) in which the population is most at risk to experience significant losses

The infrastructures and populations most at risk to experience damages and losses are located in areas where the hazard intensity and vulnerability are the highest and the coping capacity the lowest



Reference: http://tinyurl.com/ydab3jpd; http://tinyurl.com/2s3z2wnn

Other immunization related use case

Population estimation and spatial distribution with geospatial technologies

The use of statistical models, remote sensing datasets and sampled census information to create spatially accurate and precise estimates of population density and distribution.

How can it improve immunisation outcomes? Improved population denominator estimation at sub-district levels supports the measurement of programme targets and coverage in a geo-enabled immunisation programme; improves programme planning for more accurate allocation of resources and reduced waste.

What do you need? Many existing gridded population datasets are freely available for download along with guidance on intrinsic uncer-tainties and recommendations for use. Effective use of existing datasets or the creation of new model estimates requires technical capacity in geospatial statistics, database systems and computer application technology.

Main challenges: Inherent uncertainties in modelling must be carefully considered. Confidence, awareness and understanding of methods used for estimation are still developing in many national statistical offices and ministries. There is a need for more capacity building and opportunities for national health workforce.

Evidence/resource base: Practical guidance on how to use existing spatially distributed population estimates for immunisation programme planning is needed. Evidence is also needed on how denominators from modelled population estimates and spatial distribution can impact immunisation programme delivery and coverage outcomes.

Microplanning with geospatial technologies

The process of identifying communities, immunisation resources, and geographic features to create operational workplans for immunisa-tion service delivery based on spatially accurate maps.

How can it improve immunisation outcomes? Spatially accurate maps for local-level service delivery planning can improve coverage and reach of services by identifying all settlements in a given catchment area and ensuring that vaccinator work assignments are realistic and efficient.

What do you need? The validated geospatial data from health systems mapping and spatially distributed population estimates must be combined with local-level settlement names and landmarks to create maps for improved microplanning. Data collection must include stakeholders and leaders at the local level to inform the process.

Main challenges: Initial time and cost to build the capacity and systems for creating digitally enhanced maps for microplanning requires commitment and sustainable resources. Data must be updated regularly to maintain the validity and usefulness of the maps.

Evidence/resource base: Practical guidance is needed for implementing a digitally-enhanced microplanning process. Evidence is needed of the impact on routine immunisation coverage.

Disease surveillance with geospatial technologies

The collection and analysis of geolocated data on disease incidence to identify and respond to outbreaks of vaccine-preventable disease or adverse events following immunisation.

How can it improve immunisation outcomes? Disease surveillance systems with standardised data collection can improve information sharing and coordination for targeted action in response to outbreaks and contribute to optimised distribution of immunisation program re-sources and services.

What do you need? Beside the technical capacity to develop, maintain and report into a digital platform, the digital data collection must operate within an established system of investigation and response that empowers mangers to effectively utilise real-time geospatial data on disease incidence.

Main challenges: Establishing roles and responsibilities for effective data use, outbreak investigation and response; digital data collection should fit into the data reporting workflow and not create parallel reporting systems.

Evidence/resource base: Evidence is needed to understand how integrated geospatial technologies can improve outbreak detection and response.

Vaccinator tracking

The use of global positioning devices to monitor the movement of vaccination outreach teams during campaign or outreach vaccination activities.

How can it improve immunisation outcomes? In combination with validated digital health resource maps and operational microplans, it can help programme managers identify missed settlements and provide rapid corrective action to improve coverage.

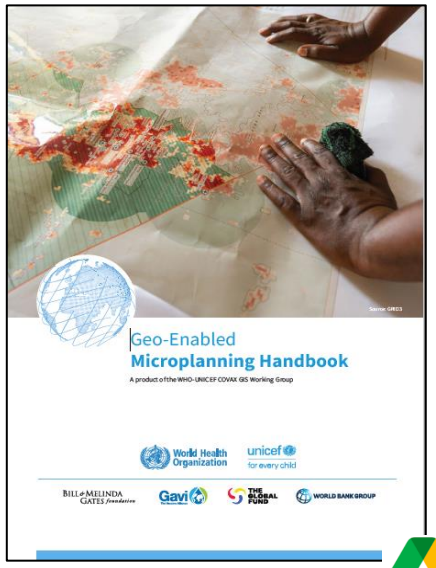
What do you need? A vaccinator tracking system must feed into an established database and user interface containing the health system map and micro-plans with complete settlement lists. Vaccinator tracking builds on top of an established and sustainable system of geo-enabled immunisation programming.

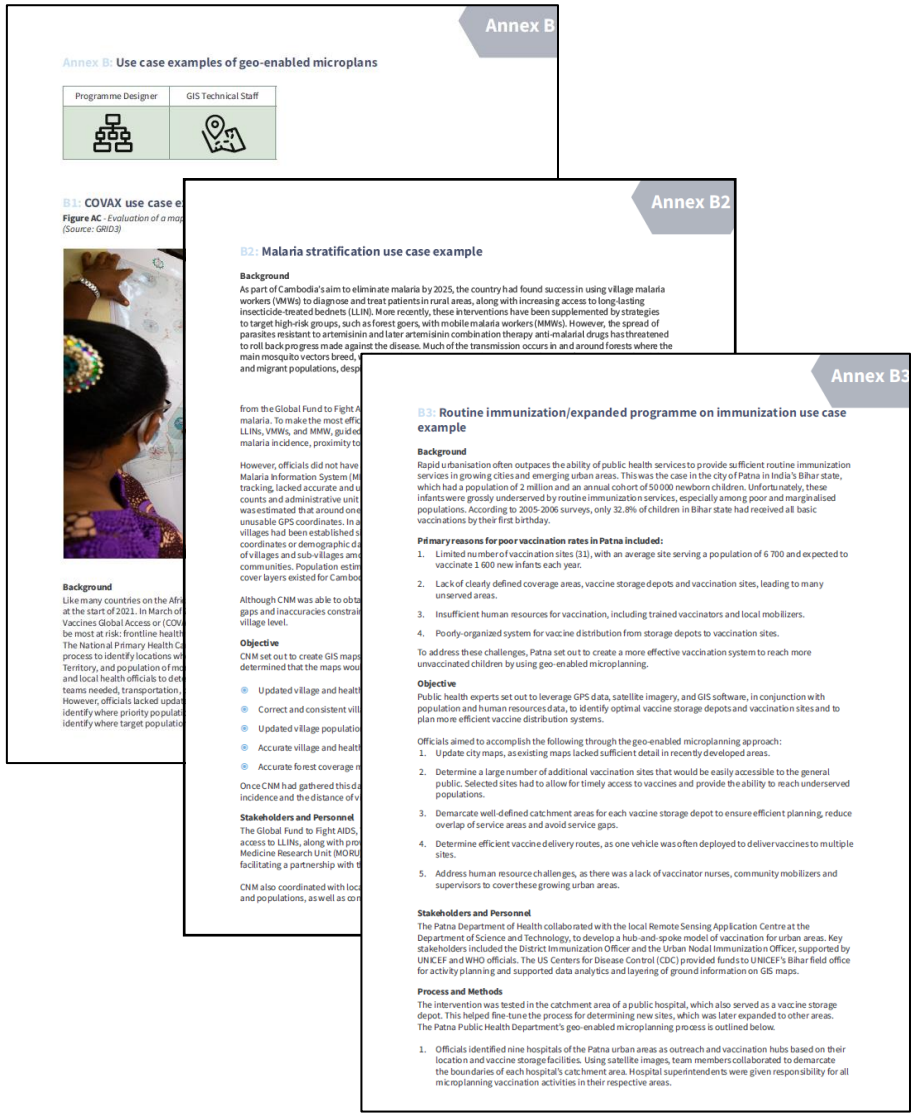
Main challenges: Mobility tracking can not guarantee that vaccines are delivered. Supportive supervision is required to maintain quality and accountability during campaign and outreach activities. Vaccinator resistance and privacy concerns must be addressed within a sys-tem of trust and transparency.

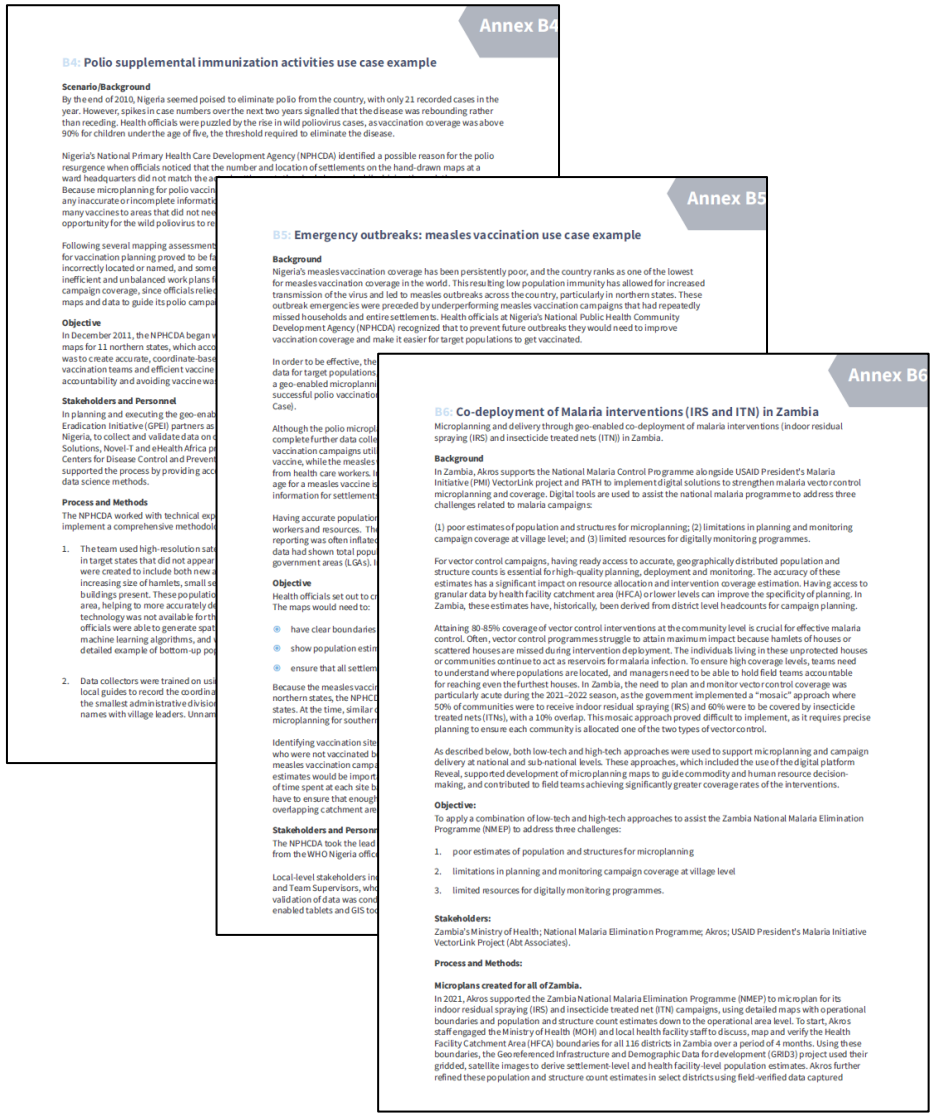
Evidence/resource base: Evidence shows that vaccinator tracking combined with operational microplans can reduce missed settlements.

https://www.gavi.org/news/document-library/leveraging-geospatial-technologies-and-data-strengthen-immunisation

Other microplanning related use case

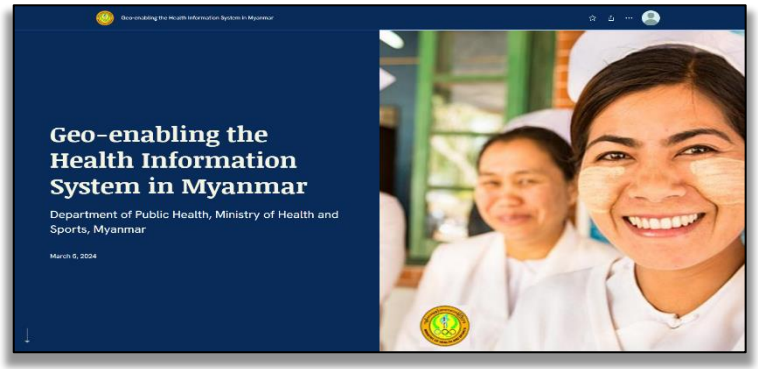






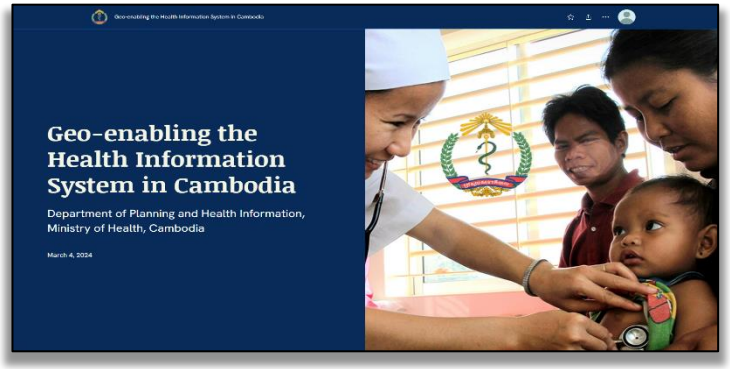
https://knowledge.unicef.org/resource/geo-enabled-microplanning-handbook

Other country specific use cases



Myanmar
(https://arcg.is/OCHOz)

Cambodia
(https://arcg.is/0uviGj)



Viet Nam
(https://arcg.is/1XmLjy)

Mongolia
(https://arcg.is/1O0u4r)

Geo-enabling the Health Information System, programs or interventions training workshop for Asia Pacific

...and beyond

Session 3: Introduction to the HIS geo-enabling framework

A geo-enabled health information system

An Information System that fully benefits from the power of **geography**, **geospatial data** and **geospatial technologies** through the proper integration of the geographic and time dimensions across its business processes

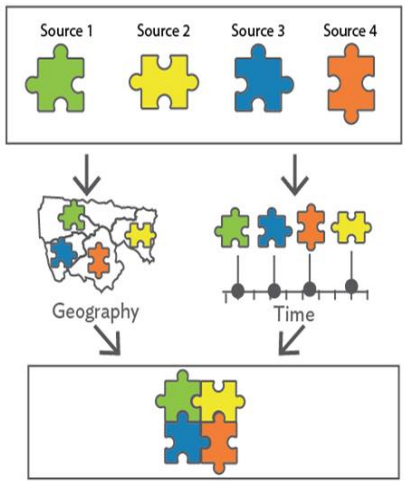
- Can you think about one piece of data or information within an HIS that has neither a geographic nor a time dimension?

" Everything happens somewhere at a given time"

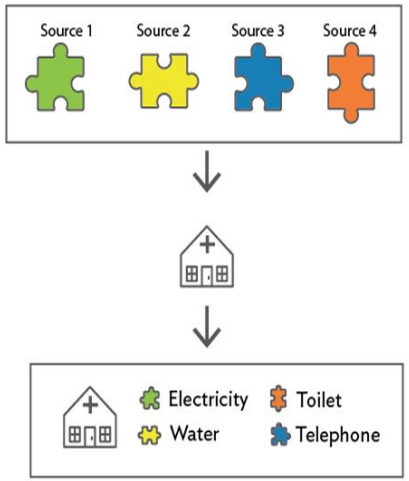
- Properly integrating geography and time in the HIS improves geographically-based decision making and provides a more systemic and systematic approach to solving public health problems.
- Directly applicable to any program or intervention

Benefits of a proper integration of the geographical and temporal dimensions in the HIS, a program or an intervention

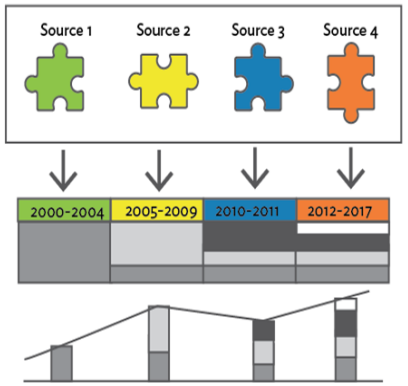
1 Contextualize data from different sources in both space and time



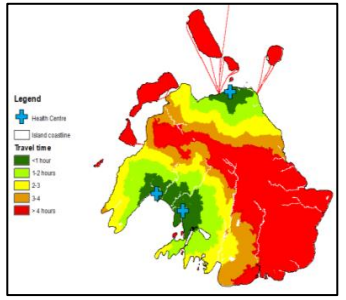
2 Use geographic features (i.e. health facilities) as the common link between data collected by different sources

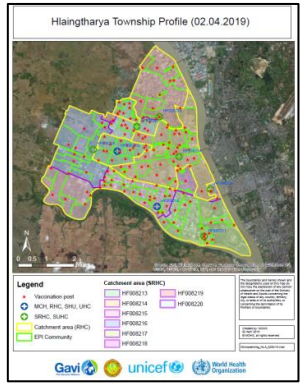


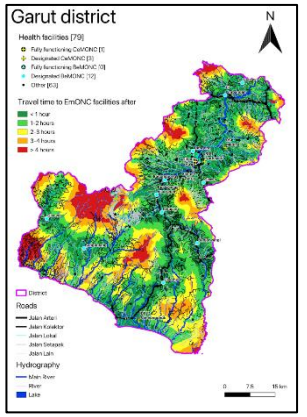
3 Facilitate trend analysis by taking into account how geography is evolving through time

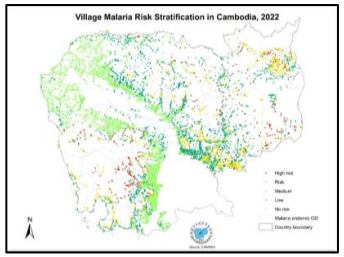


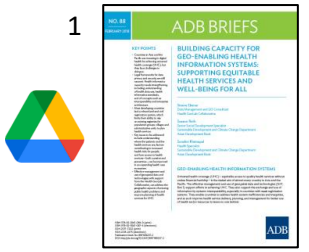
4 Use a geographic information system (GIS) to create thematic maps, conduct spatial analyses, or apply spatially distributed models











➡ How do you benefit from this in a sustainable way?

➡ By geo-enabling the health information system, programs or interventions

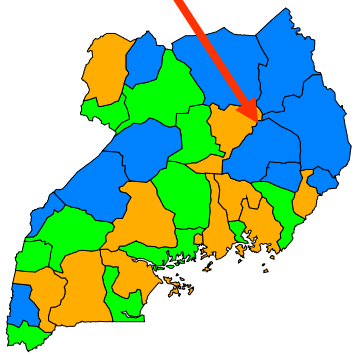
[1] https://www.adb.org/publications/building-capacity-geo-enabling-health-information-systems

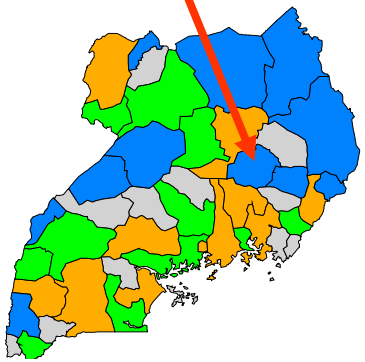
A geo-enabled health information system

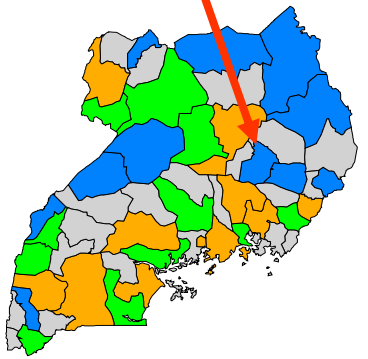
Importance of simultaneously managing the geographic and temporal dimensions

Uganda

01.01.1990-14.03.1991	15.03.1991-20.03.1997	21.03.1997-27.11.2000	28.11.2000-30.06.2001	01.07.2001-30.06.2005
Kampala	Kampala	Kampala	Kampala	Kampala
Kamuli	Kamuli	Kamuli	Kamuli	Kamuli
Kapchorwa	Kapchorwa	Kapchorwa	Kapchorwa	Kapchorwa
Kasese	Kasese	Kasese	Kasese	Kasese
Soroti	Soroti	Katakwi	Katakwi	Katakwi
		Soroti	Soroti	Soroti
				Kaberamaido
Mubende	Kiboga	Kiboga	Kiboga	Kiboga
	Mubende	Mubende	Mubende	Mubende
Kitgum	Kitgum	Kitgum	Kitgum	Kitgum
			Pader	Pader





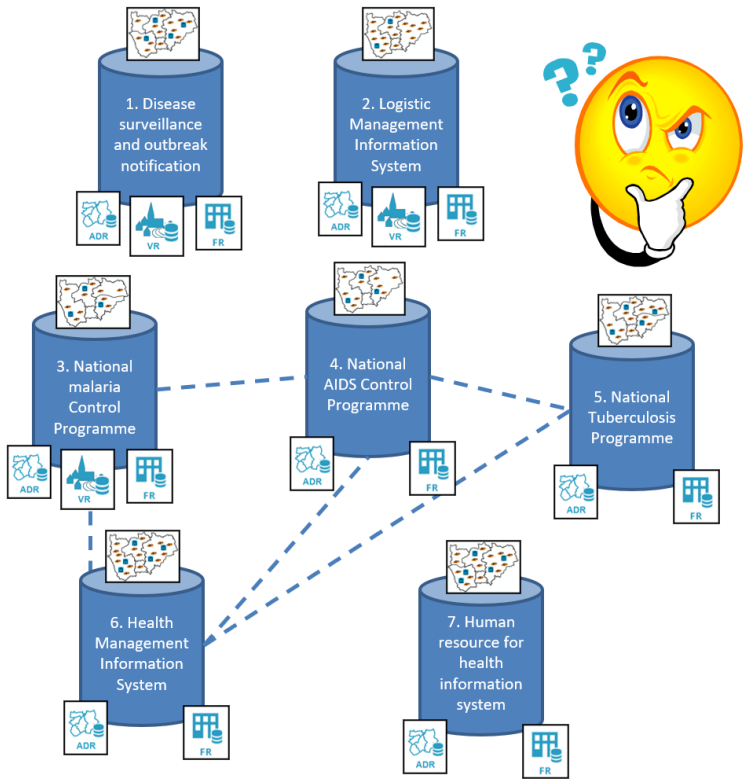


➡ Geography changes continuously over time and at a different “speed” depending on the geographic feature being considered

https://salb.un.org/en

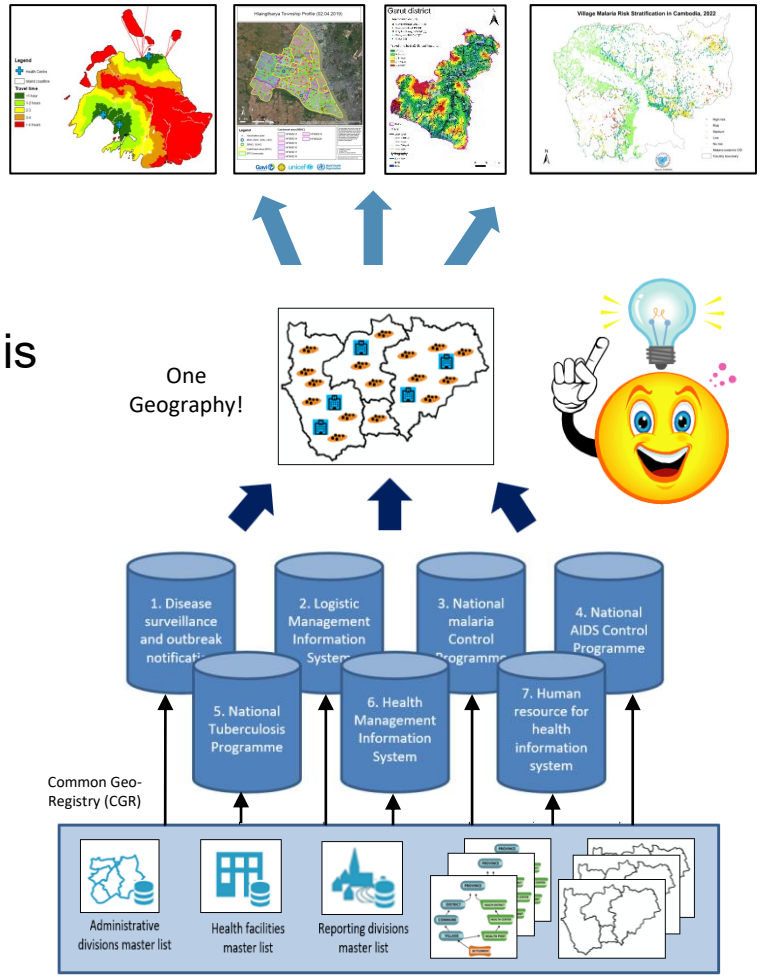
The vision behind the geo-enablement of the HIS

Passing from this …



Each information system maintains and uses a different geography which is not cost-effective and does not allow benefiting from the power of geography, geospatial data and technologies

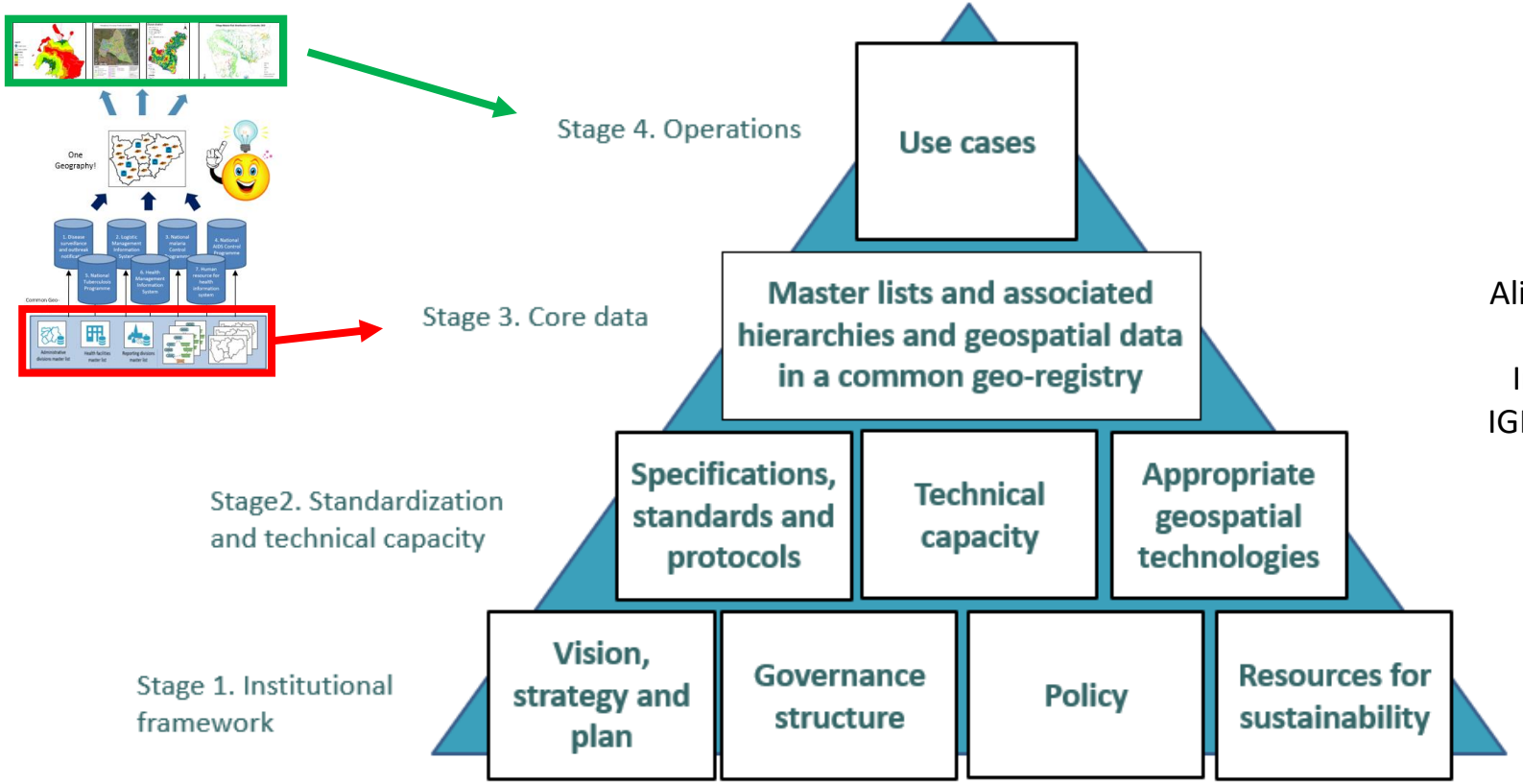
… to this



All information systems use the same geography over time, which not only reduces duplication of effort and costs, but also takes full advantage of the power of geography, geospatial data and technologies

The HIS geo-enabling framework

9 elements that must be in place and sustained over the long term for a HIS, a program or an intervention to be considered geo-enabled

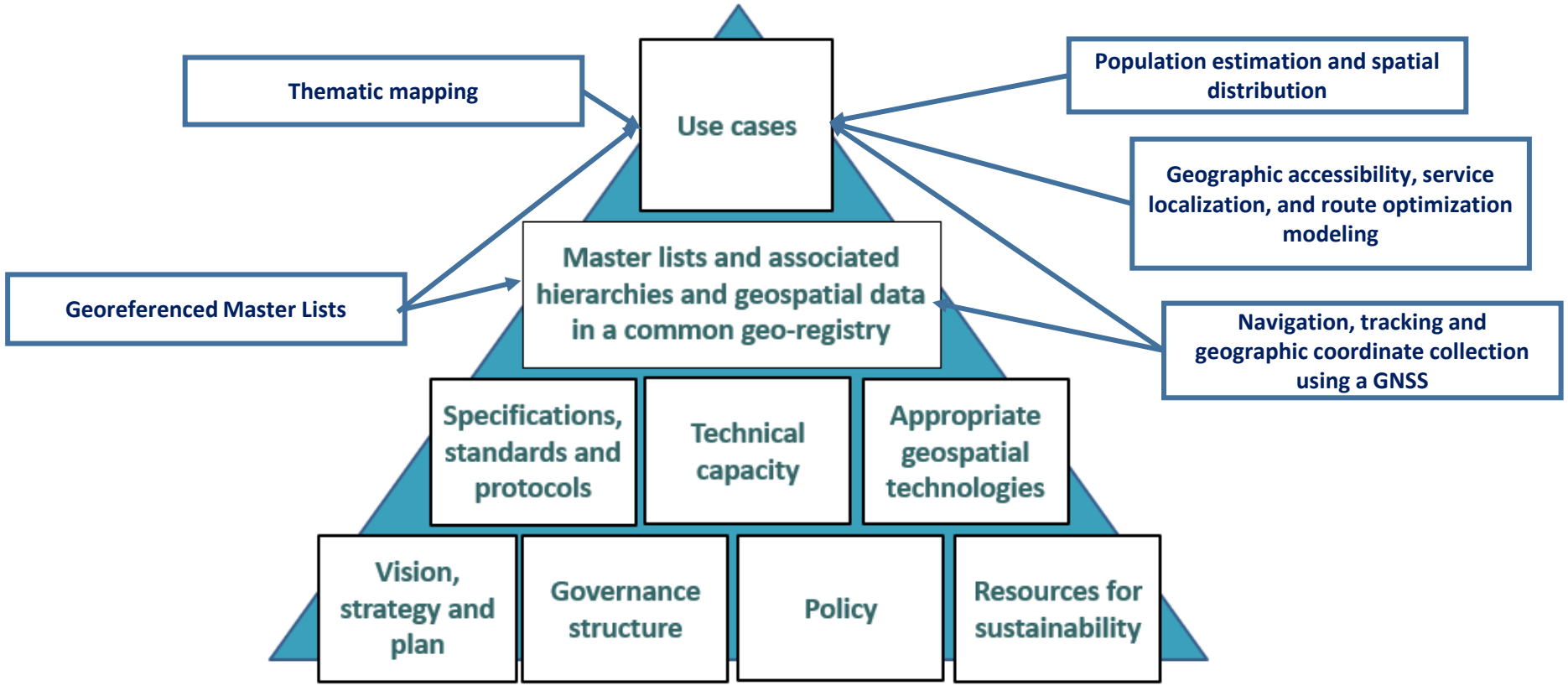


Aligned with the United Nations Integrated Geospatial Information Framework (UN-IGIF) – Cross sectoral framework

Each stage supports the next one towards an operational use of geography, geospatial data and technologies to support the implementation of health programs

The HIS geo-enabling framework

The place of the 5 main applications of geospatial data and technologies



Apart from the georeferenced master list and the collection of geographic coordinates which are also key to the core data stage of the framework, all these application are enabling the use cases

The HIS geo-enabling framework

1. A Clear **vision**, **strategy,** and **action plan** for the management and use of geospatial data and technologies have been defined.
2. A **governance structure** supporting the vision, strategy, and action plan has been established.
3. Sufficient **technical capacity** has been developed to support the proper management and use of geospatial data and technologies.
4. Geospatial data **specifications, standards, and protocols** have been defined and are being implemented to ensure the availability and quality (completeness, uniqueness, timeliness, validity, accuracy, and consistency) of geographic information across the whole data lifecycle.
5. The **master lists** for the core geographic objects (health facilities, administrative divisions and villages, and reporting divisions) and their associated hierarchies and geospatial data have been developed, made accessible, and an updating mechanism put in place for each of them using a **common geo-registry**.
6. The appropriate **geospatial technologies** have been identified and are being used in accordance with good geospatial **data management practices**.
7. **Use cases** (applications) supporting health programs (communicable diseases surveillance, malaria elimination, health service coverage, disaster management, etc.) towards reaching SDG 3 are being implemented and documented.
8. **Policies** supporting and enforcing all the above as well as geospatial data accessibility have been released.
9. The necessary **resources** to ensure long term sustainability have been identified and secured.

The HIS geo-enabling framework – Objectives and benchmarks

Element of the framework	Objective	Benchmarks
1. Vision, strategy, and action plan	A vision, a strategy and an action plan have been defined and are implemented to support the geo-enablement of the HIS	1.1 The MOH has a vision, strategy, and plans regarding the management and use of geospatial data and technologies. 1.2 Each key program has a vision, strategy and action plan regarding the management and use of geospatial data and technologies
2. Governance structure	A governance structure supporting the vision, strategy and action plan has been established and is operational	2.1. The MOH has established a governance structure to handle issues pertaining to the management and use of geospatial data and technologies. 2.2. All the health program and the stakeholders involved in the management and use of geospatial data and technologies in health are part of the governance structure. 2.3 The MOH is on board of the National Spatial Data Infrastructure (NSDI).
3. Technical capacity	The central units of the Ministry of Health as well as the main health programs have sufficient technical capacity to manage and use geospatial data and technologies	3.1. The MOH has a central level geospatial data and technologies management unit (GDTMU) with enough technical capacity to: a) ensure guardianship over the defined guidelines, standards and protocols; b) support the development, maintenance, regular update and sharing of the master lists for the geographic objects core to public health; c) support the implementation of the guidelines, standards, protocols, and master lists across all health programs and information systems; and d) providing services to the HIS unit and beyond if needed. 3.2 The key health programs have enough technical capacity to support the implementation of their activities with the support of the central level unit
4. Data specifications, standards and protocols	All programs use the same data specifications, standards and protocols to ensure geospatial data quality	4.1. The NSDI has defined the geospatial data and technologies related specifications, standards and protocols that should be used by all governmental agencies. 4.2. The MOH is using the geospatial data and technologies related specifications, standards and protocols across all key health programs.

Used to assess the current level of geo-enablement in each country and as the basis for developing the action plan to fill existing gaps

The HIS geo-enabling framework – Objectives and benchmarks

Element of the framework	Objective	Benchmarks
5. Master lists and common geo-registry	The Ministry of Health has quality master lists and associated GIS layers for the geographic objects key to public health	5.1. The MOH has a complete, up-to-date, uniquely coded, and geo-referenced (for point type objects) master list for each geographic object key to public health (health facilities, administrative divisions and villages, reporting divisions. 5.2. The government maintains, regularly updates, and share shapefiles containing the boundaries of the administrative and health reporting divisions. 5.3 These master lists and associated spatial data are simultaneously hosted, maintained, regularly updated, and shared using a Common Geo-Registry. 5.4. All the master lists, and especially their officially recognized codes, are being integrated in all the information systems and used for data collection, reporting, and monitoring across all health programs.
6. Appropriate geospatial technologies	The central unit of the Ministry of Health as well as the main health programs have access to the necessary and appropriate geospatial technologies	6.1. The central level geospatial data management and technologies unit has access to the necessary and appropriate geospatial technologies (GNSS, GIS) to support its mandate. 6.2 The key health programs have access to the necessary and appropriate geospatial technologies (GNSS, GIS) to support the implementation of their activities
7. Documented use cases	The benefits of managing and using geospatial data and technologies are recognized by all programs and use cases demonstrating this are documented	7.1. Geospatial data and technologies are recognized as important and their full potential is being used to support the implementation of key health programs towards reaching SDG 3. 7.2 Use cases supporting decision making and/or planning are documented and available.
8. Policies supporting the geo-enabling process	The necessary policies to support the geo-enablement of the Health Information System have been defined and are being applied	8.1. A policy/Policies enforcing the following has/have been released: a) The mandate over the guardianship on geospatial data specifications, standards, and protocols as well as over the development, maintenance, update, and sharing of master lists for the geographic objects core to public health using a common geo-registry. b) The use of the developed specifications, standards, protocols, and master lists by all the stakeholders in the health sector.
9. Resource for sustainability	The financial resources necessary to ensure the sustainability of geo-enablement exist in the long term	9.1. The central level geospatial data management and technologies unit has the necessary financial resources to ensure the long-term sustainability of its activities linked to the geo-enablement of the HIS. 9.2 The key health programs have the necessary financial resources to ensure the long-term sustainability of their activities

Used to assess the current level of geo-enablement in each country and as the basis for developing the action plan to fill existing gaps

The HIS geo-enabling framework - Origin

1

Situation in countries of the Asia-Pacific region (2017)

Géo-enabling components	BGD	BTN	KHM	FJI	IND	IDN	LAO	MMR	MYS	NPL	PHL	LKA	VNM
1. Vision, needs, stratégy and plan	In process	Existing	In process	In process	Existing	Not existing	In process	In process	Existing	In process	Not existing	In process	Not existing
2a. Governance structure	In process	In process	Not existing	In process	Existing	Not existing	In process	Not existing	Existing	In process	Existing	In process	In process
2b. GIS technical capacity	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing
3. Data specifications, standards and protocols	Not existing	Existing	Not existing	In process	In process	In process	Not existing	In process	In process	Not existing	Existing	Not existing	Not existing
4. Master list	In process	In process	In process	In process	In process	In process	In process	In process	In process	In process	In process	In process	In process
5. GIS technology	In process	In process	Existing	Existing	In process	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing
6. Map production (use)	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing
7. Policy	Not existing	In process	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	In process
8. Resources for sustainability	In process	In process	Not existing	Not existing	Not existing	Not existing	In process	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing

Existing | In process | Not existing

Has received a GIS training (mainly in data collection and thematic mapping)

Has access to a GIS software

Generates thematic maps, but spatial analysis and modelling are very limited

BGD = Bangladesh, BTN = Bhutan, KHM = Cambodia, FJI = Fiji, IND = Inde, IDN = Indonésia, LAO = République Démocratique Populaire du Lao, MMR = Myanmar, MYS = Malaysie, NPL = Népal, PHL = Philippines, LKA = Sri Lanka, VNM = Viet Nam.

Important gaps for the elements guaranteeing the quality, effectiveness and long-term sustainability of data and information products

[1] Source: https://www.adb.org/publications/building-capacity-geo-enabling-health-information-systems

The HIS geo-enabling framework - Origin

Situation in French speaking African countries (2023)

Stage 4. Operations

Stage 3. Core data

Stage 2. Standardization and technical capacity

Stage 1. Institutional framework

Element of the HIS geo-enabling framework		BFA	BDI	COG	CIV	GIN	MDG	MLI	CAF	COD	SEN	TGO
Use cases	HIS											
	Malaria											
	TB											
	HIV											
Master lists and geospatial data and Common Geo-Registry (CGR)												
Data specifications, standards and protocols												
Technical capacity	HIS											
	Malaria											
	TB											
	HIV											
Geospatial technologies	HIS											
	Malaria											
	TB											
	HIV											
Vision, strategy and plan												
Governance mechanism												
Policies												
Financial resources	HIS											
	Malaria											
	TB											
	HIV											

Missing / not started In progress/insufficient Completed/sufficient

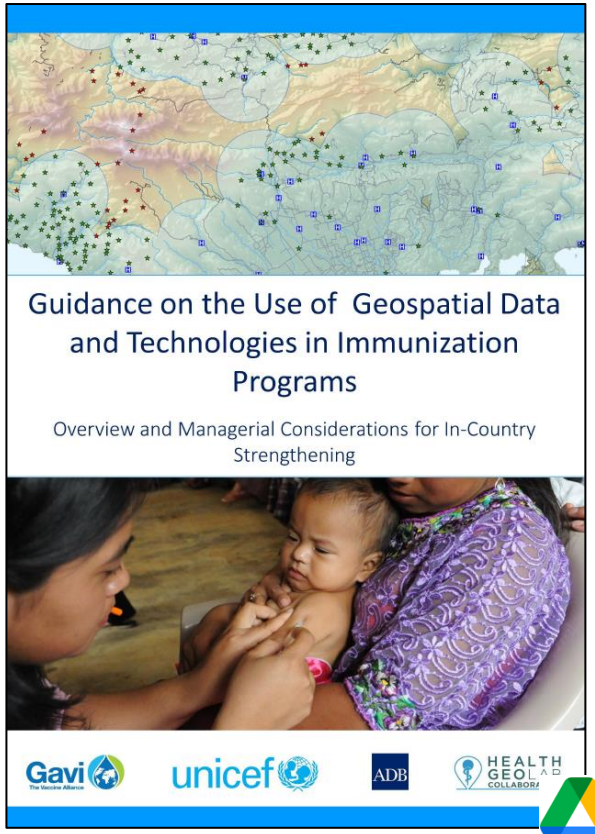
Series of use cases that have not been institutionalized

BFA = Burkina Faso, BDO = Burundi, COG = Republic of Congo, CIV = Ivory Coast, GIN = Guinea, MDG = Madagascar, MLI = Mali, CAF = Central African Republic, COD = Democratic Republic of the Congo, SEN = Senegal, TGO = Togo

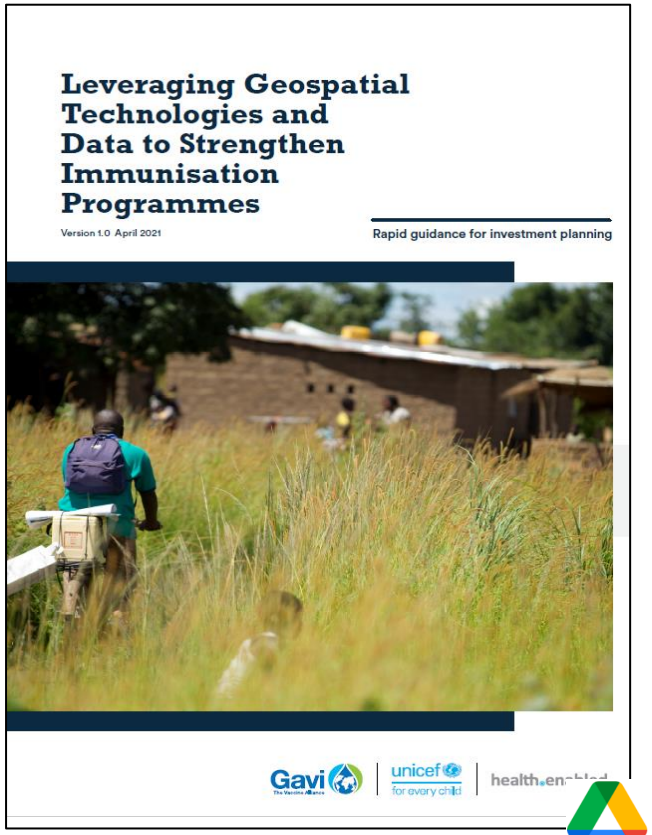
Important gaps for the elements guaranteeing the quality, effectiveness and long-term sustainability of data and information products and this across programs

Guidelines including/based on the HIS geo-enabling framework

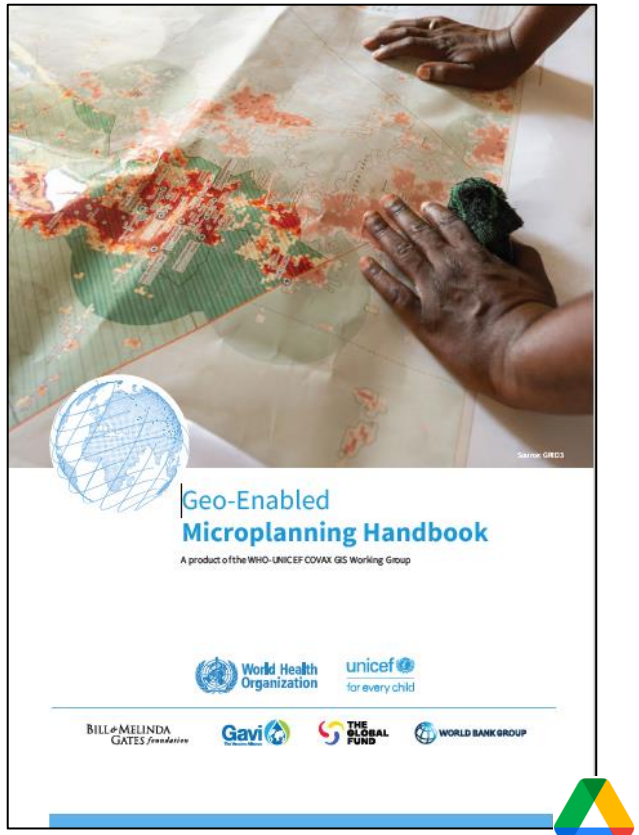
2018



2021



2023



➡ Framework used by UNICEF, GAVI, WHO and the Global Fund to support the management and use of geospatial data and technologies in countries.

1 https://www.unicef.org/media/58181/file
2 https://www.gavi.org/news/document-library/leveraging-geospatial-technologies-and-data-strengthen-immunisation
3 https://drive.google.com/file/d/1jj779zww4herWOESAd9mXqVE1YfQehtH/view?usp=sharing

The HIS geo-enabling framework in the 3 guidelines

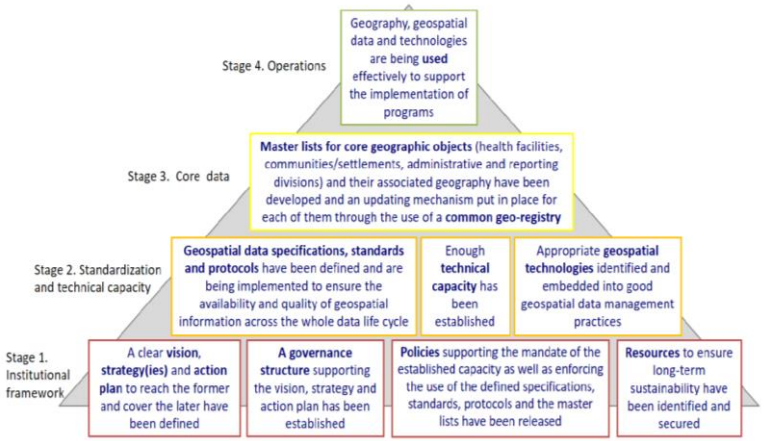
	Guidance on the Use of Geospatial Data and Technologies in Immunization Programs	Rapid guidance for investment planning	Geo-Enabled Microplanning Handbook
Objective/purpose	Provide a non-technical introduction to the role of geospatial data and technologies in immunization programs and propose a process-based framework to guide decision-makers and planners in strengthening the management and use of geospatial data and geospatial technologies in immunization program in countries.	Provides information, steps and important considerations for the process of selecting, planning and budgeting geospatial data and technology applications for immunization.	Provide health officials with guidance on how to integrate geospatial data and technologies – in particular, geographic information systems (GIS) – into the microplanning process. The handbook also provides evidence on the benefits of geo-enabled microplanning
Target audience	All stakeholders interested in advocating for or investing in the management and use of geospatial data and technologies in immunization programs.	In country immunization programs willing to invest in the use of geospatial data and technology applications	Public health program managers/ designers (country relevant staff, health officials at national and subnational level) and technical experts (GIS and other technical staff supporting microplanning efforts)

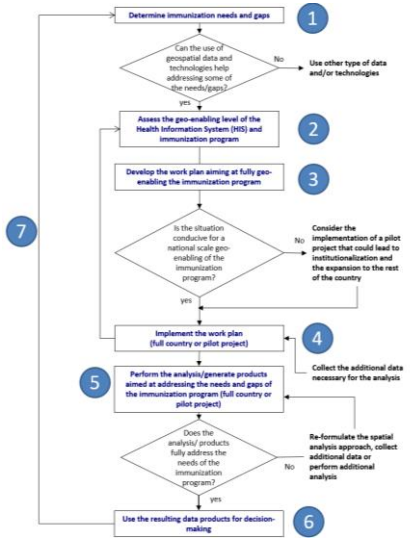
Promotion | Resource mobilization | Technical implementation

- Complementary while presenting some overlap
- Applicable to other health programs and interventions

The HIS geo-enabling framework in the 3 guidelines

Guidance on the Use of Geospatial Data and Technologies in Immunization Programs

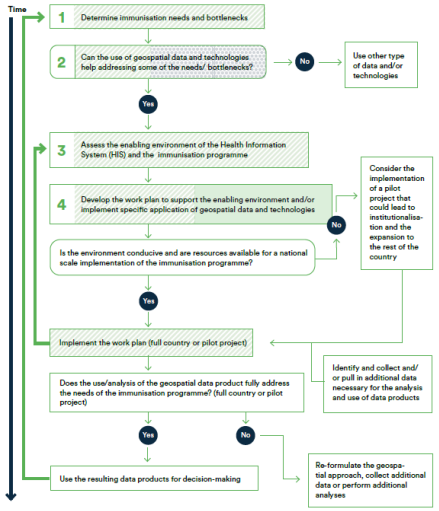




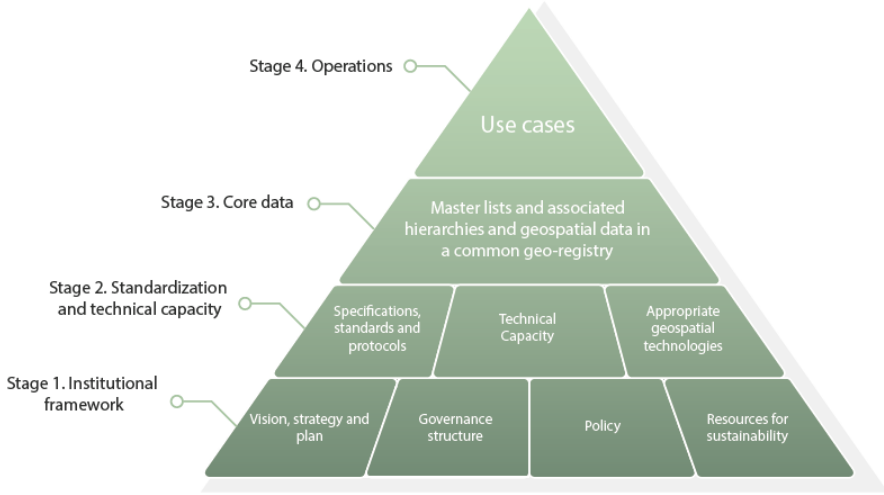
Rapid guidance for investment planning

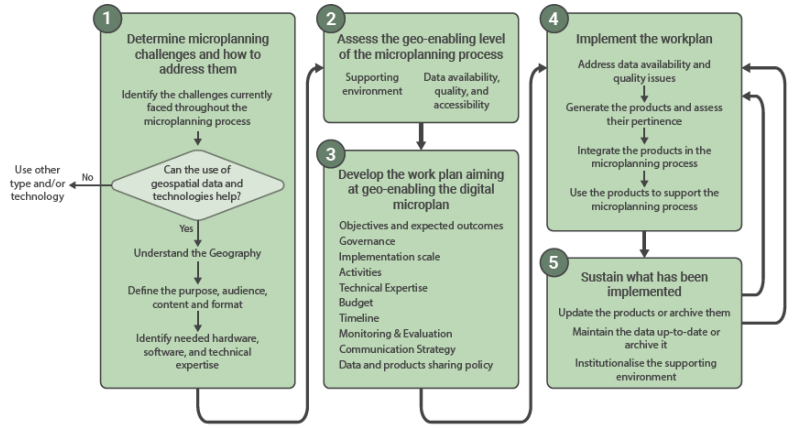
Considerations for the geo-enabling environment

The long-term sustainability of these applications will depend on the availability of the necessary enabling environment. The elements that compose the enabling environment have been captured in the HIS geo-enabling framework developed by the Health GeoLab Collaborative [7] and used as reference by UNICEF when developing the geo-enabling framework for the immunisation programme as part of the 2018 UNICEF Guidance [2].

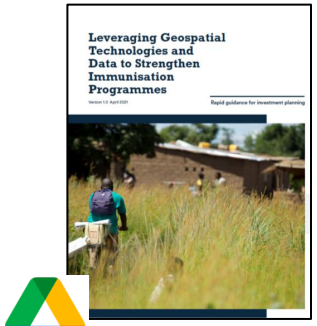


Geo-Enabled Microplanning Handbook

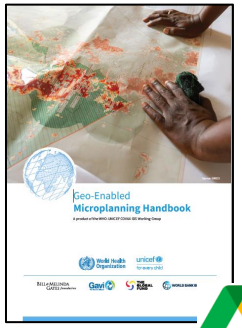


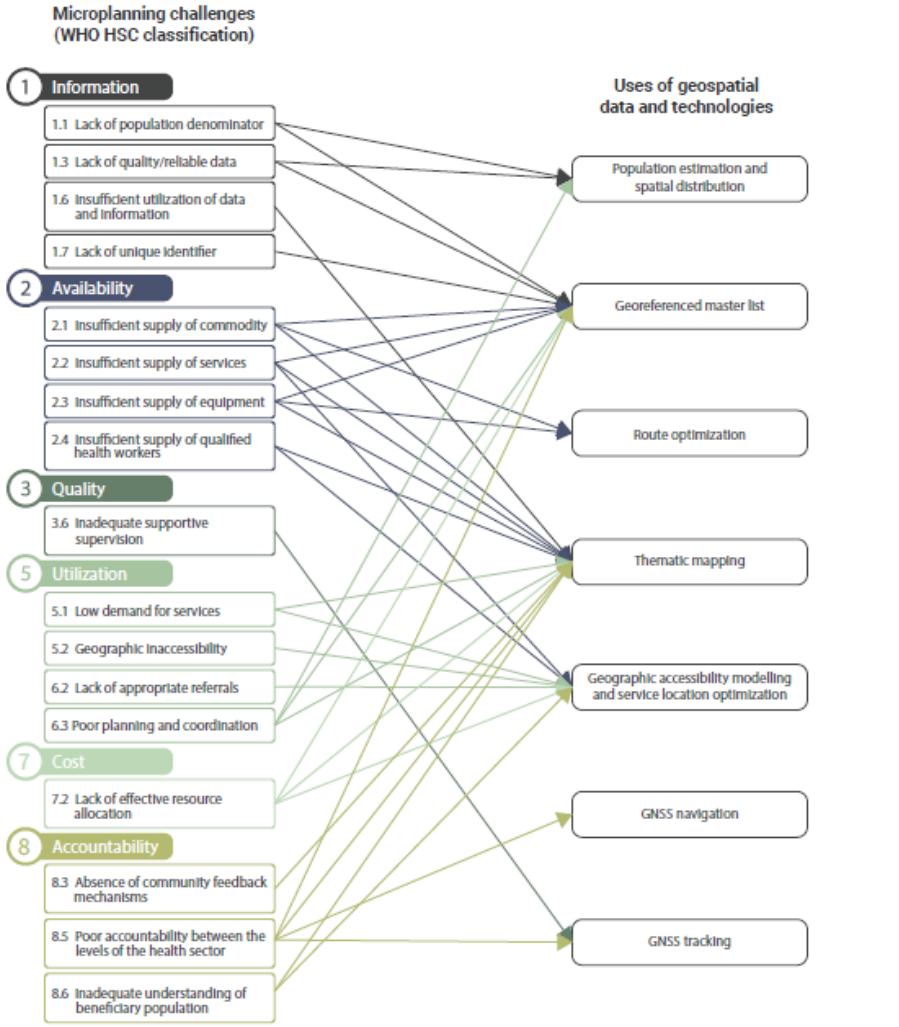


Additional useful tools – Challenges addressed by applications of geospatial data and technologies



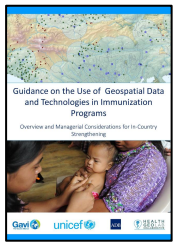
Health System Challenges (WHO Classification)	Applications of Geospatial Data and Technologies
1.1 Lack of population denominator 6.3 Poor planning and coordination	**Population estimation and spatial distribution** Map population density and distribution using statistical models, remote sensing datasets and census information
1.3 Lack of quality/reliable data 1.6 Insufficient utilization of data and information 6.3 Poor planning and coordination	**Health system mapping** • Map the location of health facilities/ infrastructure • Map location of inhabited settlements • Map boundaries of health boundaries (health districts, catchment areas) • Standardised data storage, update, management and sharing
3.6 Inadequate supportive supervision 6.3 Poor planning and coordination 8.5 Poor accountability between the levels of the health sector	**Vaccination session tracking** • Map the progress of vaccination activities during house-to-house campaigns or routine immunisation outreach activities • Map the geographic coverage of vaccination activities
1.5 Lack of access to information or data 1.6 Insufficient utilisation of data and information 3.6 Inadequate supportive supervision 6.3 Poor planning and coordination	**Campaign monitoring** • Collect near real-time geolocated data of daily vaccination coverage, vaccine supply & stockouts • Map campaign data to support real-time monitoring
1.6 Insufficient utilisation of data and information 6.3 Poor planning and coordination 7.2 Lack of effective resource allocation	**Vaccination Coverage modelling** • Compute vaccine coverage for sub-national units using surveys and routine administrative information • Map differences in immunisation coverage between population subgroups for sub-national units • Map number of unimmunised or under-immunised children for sub-national units
1.2 Delayed reporting of events 1.3 Lack of quality/reliable data 1.5 Lack of access to information or data 6.3 Poor planning and coordination	**Disease surveillance** • Map location of suspected or confirmed disease cases • Visualise and analyze disease incidence to identify and respond to outbreaks

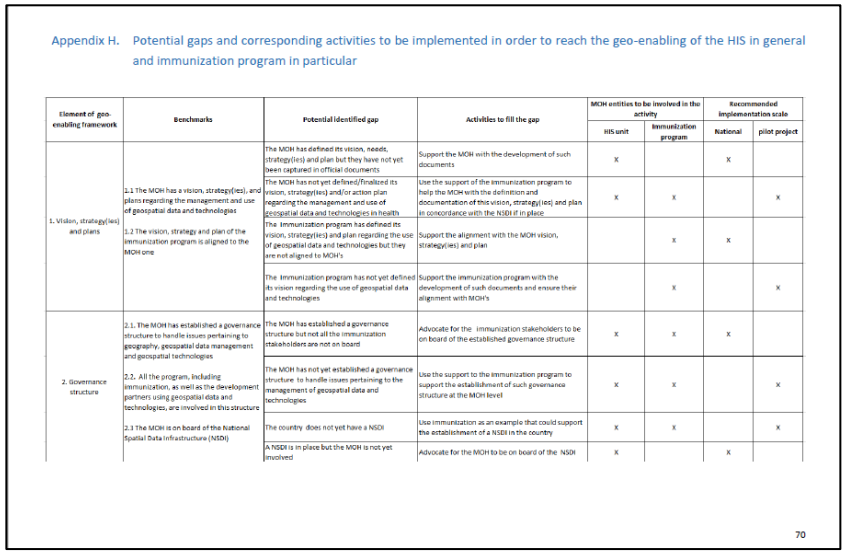




Additional useful tools – Program specific supporting material

Guidance on the Use of Geospatial Data and Technologies in Immunization Programs



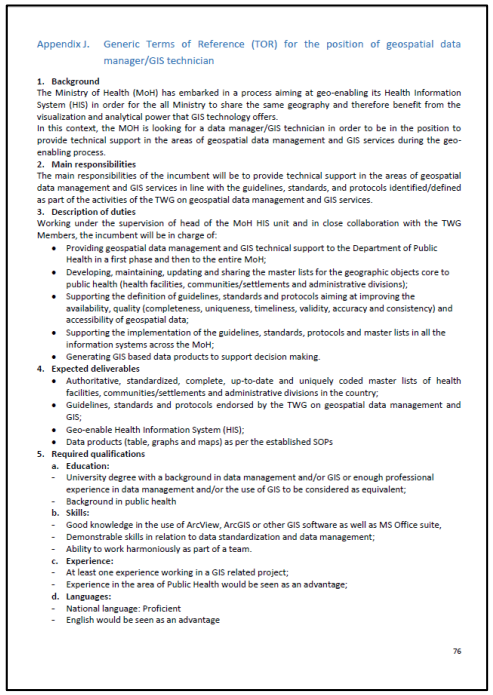


Appendix H. Potential gaps and corresponding activities to be implemented in order to reach the geo-enabling of the HIS in general and immunization program in particular

Element of geo-enabling framework	Benchmarks	Potential identified gap	Activities to fill the gap	MOH entities to be involved in the activity		Recommended implementation scale	
				HIS unit	Immunization program	National	pilot project
1. Vision, strategy(ies) and plans	1.1 The MOH has a vision, strategy(ies), and plans regarding the management and use of geospatial data and technologies	The MOH has defined its vision, needs, strategy(ies) and plan but they have not yet been captured in official documents	Support the MOH with the development of such documents	x		x	
		The MOH has not yet defined/finalized its vision, strategy(ies) and/or action plan regarding the management and use of geospatial data and technologies in health	Use the support of the immunization program to help the MOH with the definition and documentation of this vision, strategy(ies) and plan in concordance with the NSDI if in place	x	x		x
	1.2 The vision, strategy and plan of the immunization program is aligned to the MOH one	The Immunization program has defined its vision, strategy(ies) and plan regarding the use of geospatial data and technologies but they are not aligned to MOH's	Support the alignment with the MOH vision, strategy(ies) and plan		x	x	
		The Immunization program has not yet defined its vision regarding the use of geospatial data and technologies	Support the immunization program with the development of such documents and ensure their alignment with MOH's		x		x
2. Governance structure	2.1. The MOH has established a governance structure to handle issues pertaining to geography, geospatial data management and geospatial technologies	The MOH has established a governance structure but not all the immunization stakeholders are not on board	Advocate for the immunization stakeholders to be on board of the established governance structure	x	x	x	
	2.2. All the program, including immunization, as well as the development partners using geospatial data and technologies, are involved in this structure	The MOH has not yet established a governance structure to handle issues pertaining to the management of geospatial data and technologies	Use the support to the immunization program to support the establishment of such governance structure at the MOH level	x	x		x
	2.3 The MOH is on board of the National Spatial Data Infrastructure (NSDI)	The country does not yet have a NSDI	Use immunization as an example that could support the establishment of a NSDI in the country	x	x		x
		A NSDI is in place but the MOH is not yet involved	Advocate for the MOH to be on board of the NSDI	x		x	

70

Strategies, stakeholders' involvement and implementation level to fill existing gaps



Appendix J. Generic Terms of Reference (TOR) for the position of geospatial data manager/GIS technician

1. Background
The Ministry of Health (MoH) has embarked in a process aiming at geo-enabling its Health Information System (HIS) in order for the all Ministry to share the same geography and therefore benefit from the visualization and analytical power that GIS technology offers.
In this context, the MOH is looking for a data manager/GIS technician in order to be in the position to provide technical support in the areas of geospatial data management and GIS services during the geo-enabling process.

2. Main responsibilities
The main responsibilities of the incumbent will be to provide technical support in the areas of geospatial data management and GIS services in line with the guidelines, standards, and protocols identified/defined as part of the activities of the TWG on geospatial data management and GIS services.

3. Description of duties
Working under the supervision of head of the MoH HIS unit and in close collaboration with the TWG Members, the incumbent will be in charge of:

- Providing geospatial data management and GIS technical support to the Department of Public Health in a first phase and then to the entire MoH;
- Developing, maintaining, updating and sharing the master lists for the geographic objects core to public health (health facilities, communities/settlements and administrative divisions);
- Supporting the definition of guidelines, standards and protocols aiming at improving the availability, quality (completeness, uniqueness, timeliness, validity, accuracy and consistency) and accessibility of geospatial data;
- Supporting the implementation of the guidelines, standards, protocols and master lists in all the information systems across the MoH;
- Generating GIS based data products to support decision making.

4. Expected deliverables

- Authoritative, standardized, complete, up-to-date and uniquely coded master lists of health facilities, communities/settlements and administrative divisions in the country;
- Guidelines, standards and protocols endorsed by the TWG on geospatial data management and GIS;
- Geo-enable Health Information System (HIS);
- Data products (table, graphs and maps) as per the established SOPs

5. Required qualifications

a. Education:
- University degree with a background in data management and/or GIS or enough professional experience in data management and/or the use of GIS to be considered as equivalent;
- Background in public health

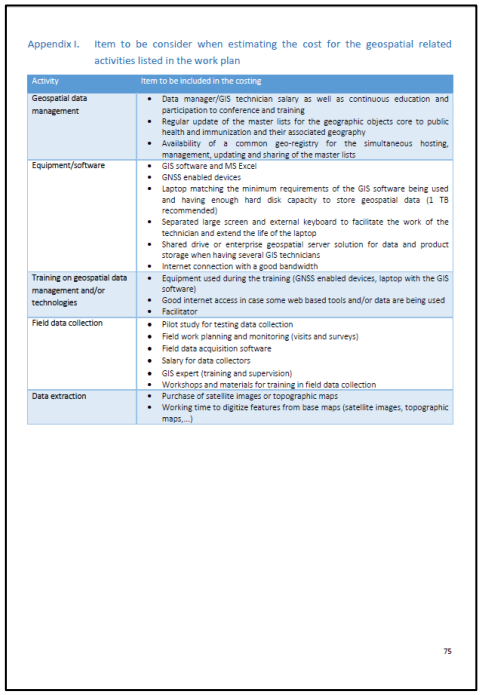
b. Skills:
- Good knowledge in the use of ArcView, ArcGIS or other GIS software as well as MS Office suite,
- Demonstrable skills in relation to data standardization and data management;
- Ability to work harmoniously as part of a team.

c. Experience:
- At least one experience working in a GIS related project;
- Experience in the area of Public Health would be seen as an advantage;

d. Languages:
- National language: Proficient
- English would be seen as an advantage

76

Terms of reference

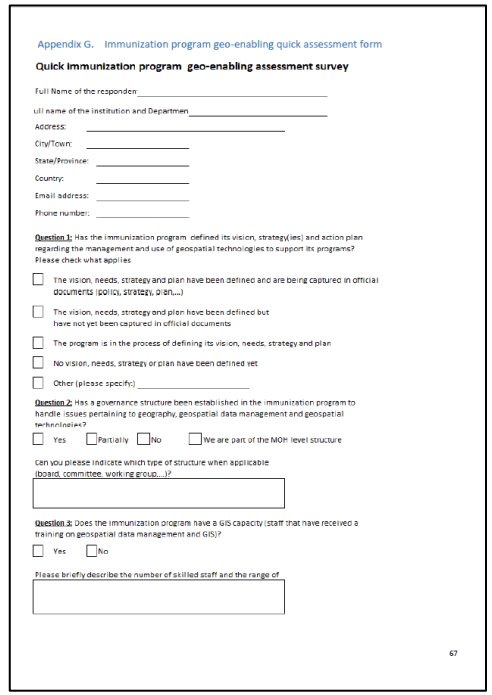


Appendix I. Item to be consider when estimating the cost for the geospatial related activities listed in the work plan

Activity	Item to be included in the costing
Geospatial data management	• Data manager/GIS technician salary as well as continuous education and participation to conference and training • Regular update of the master lists for the geographic objects core to public health and immunization and their associated geography • Availability of a common geo-registry for the simultaneous hosting, management, updating and sharing of the master lists
Equipment/software	• GIS software and MS Excel • GNSS enabled devices • Laptop matching the minimum requirements of the GIS software being used and having enough hard disk capacity to store geospatial data (1 TB recommended) • Separated large screen and external keyboard to facilitate the work of the technician and extend the life of the laptop • Shared drive or enterprise geospatial server solution for data and product storage when having several GIS technicians • Internet connection with a good bandwidth
Training on geospatial data management and/or technologies	• Equipment used during the training (GNSS enabled devices, laptop with the GIS software) • Good internet access in case some web based tools and/or data are being used • Facilitator
Field data collection	• Pilot study for testing data collection • Field work planning and monitoring (visits and surveys) • Field data acquisition software • Salary for data collectors • GIS expert (training and supervision) • Workshops and materials for training in field data collection
Data extraction	• Purchase of satellite images or topographic maps • Working time to digitize features from base maps (satellite images, topographic maps,…)

75

Items for consideration when estimating costing



Appendix G. Immunization program geo-enabling quick assessment form

Quick immunization program geo-enabling assessment survey

Full Name of the responden
ull name of the institution and Departmen
Address:
City/Town:
State/Province:
Country:
Email address:
Phone number:

Question 1: Has the immunization program defined its vision, strategy(ies) and action plan regarding the management and use of geospatial technologies to support its programs?
Please check what applies

- ☐ The vision, needs, strategy and plan have been defined and are being captured in official documents (policy, strategy, plan,…)
- ☐ The vision, needs, strategy and plan have been defined but have not yet been captured in official documents
- ☐ The program is in the process of defining its vision, needs, strategy and plan
- ☐ No vision, needs, strategy or plan have been defined yet
- ☐ Other (please specify:)

Question 2: Has a governance structure been established in the immunization program to handle issues pertaining to geography, geospatial data management and geospatial technologies?

☐ Yes ☐ Partially ☐ No ☐ We are part of the MOH level structure

Can you please indicate which type of structure when applicable (board, committee, working group,…)?

Question 3: Does the immunization program have a GIS capacity (staff that have received a training on geospatial data management and GIS)?

☐ Yes ☐ No

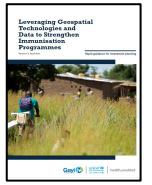
Please briefly describe the number of skilled staff and the range of

67

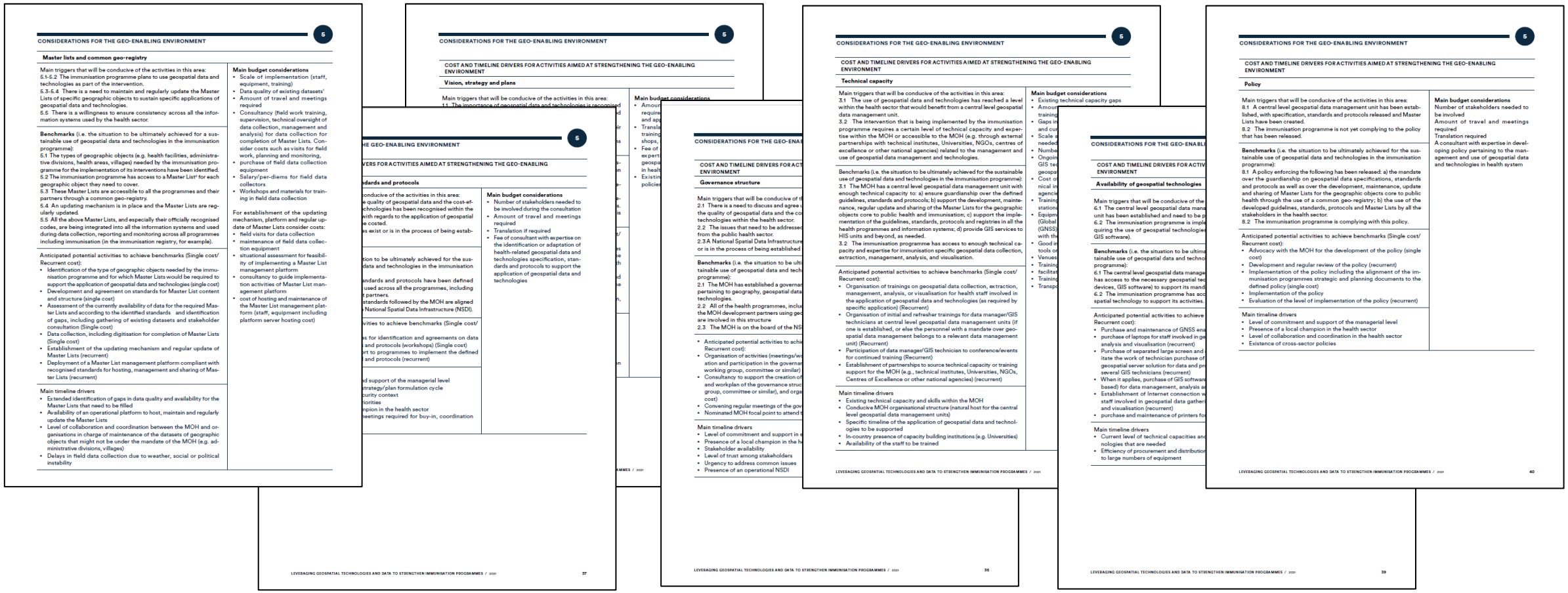
Quick assessment tool

➡ Can be contextualized to be applicable to any health program

Additional useful tools - Cost and timeline drivers for activities aimed at strengthening the geo-enabling environment

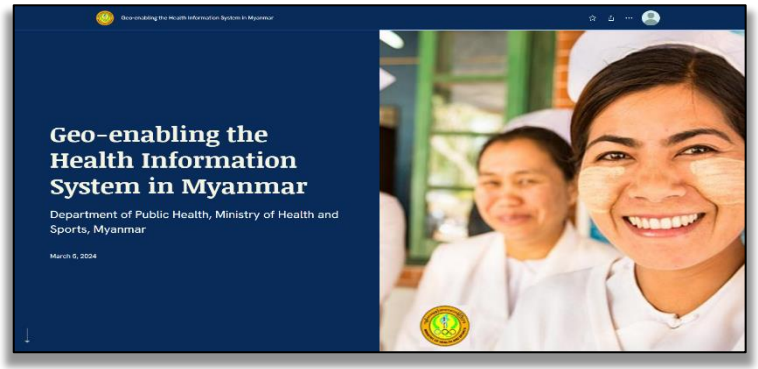


Rapid guidance for investment planning



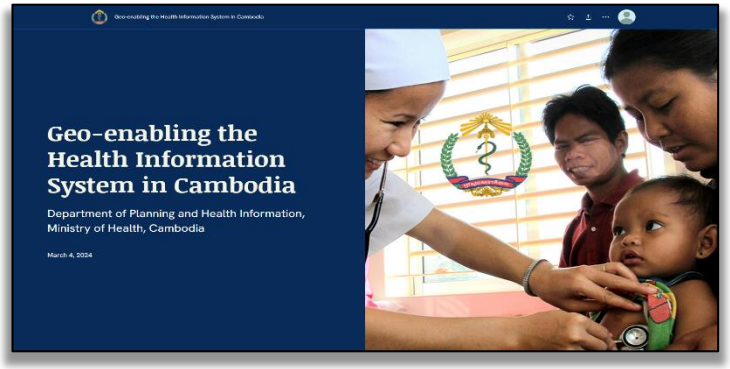
➡ Provided for 7 of the 9 elements of the HIS geo-enabling framework

Example of in-country implementation



Myanmar
(https://arcg.is/OCHOz)

Cambodia
(https://arcg.is/0uviGj)



Viet Nam
(https://arcg.is/1XmLjy)

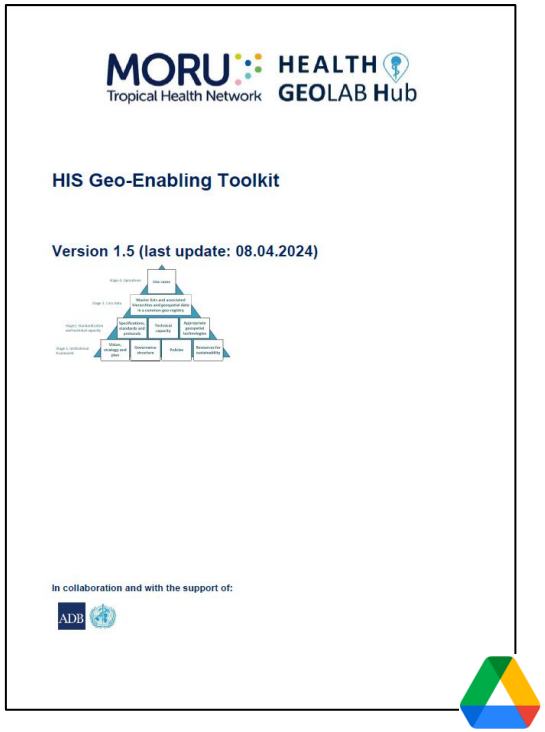
Mongolia
(https://arcg.is/1O0u4r)

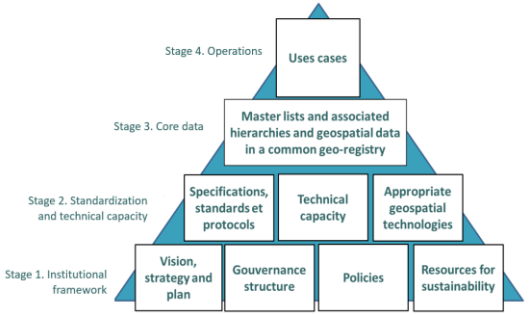
Example of in-country implementation - Myanmar

Supports the convergence of efforts and resources

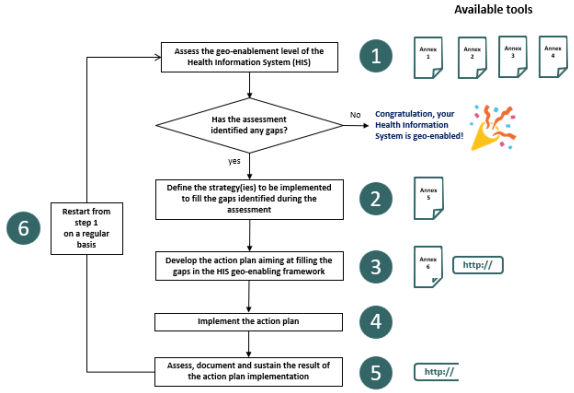
The HIS Geo-enabling toolkit

Designed to help countries assess their level of HIS geo-enabling and develop the action plan aimed at filling the identified gaps

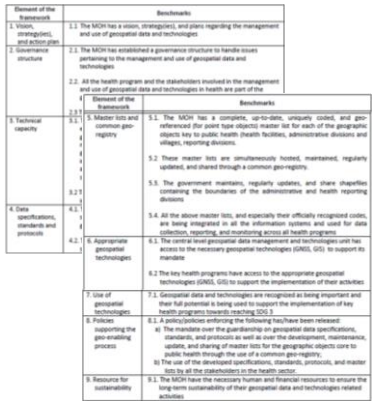




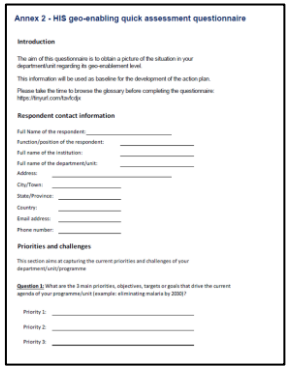
HIS geo-enabling framework pyramid



Implementation process and associated materials

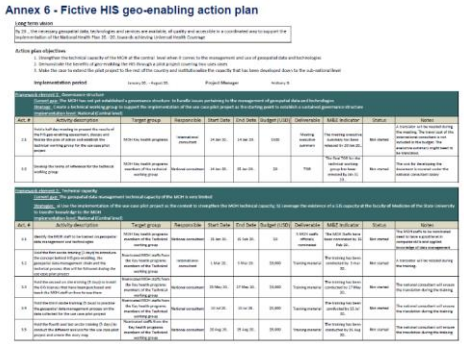


Benchmarks



HIS Geo-enabling quick assessment questionnaire

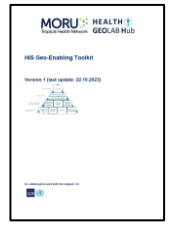
Strategies, stakeholder engagement and level of implementation to address existing gaps



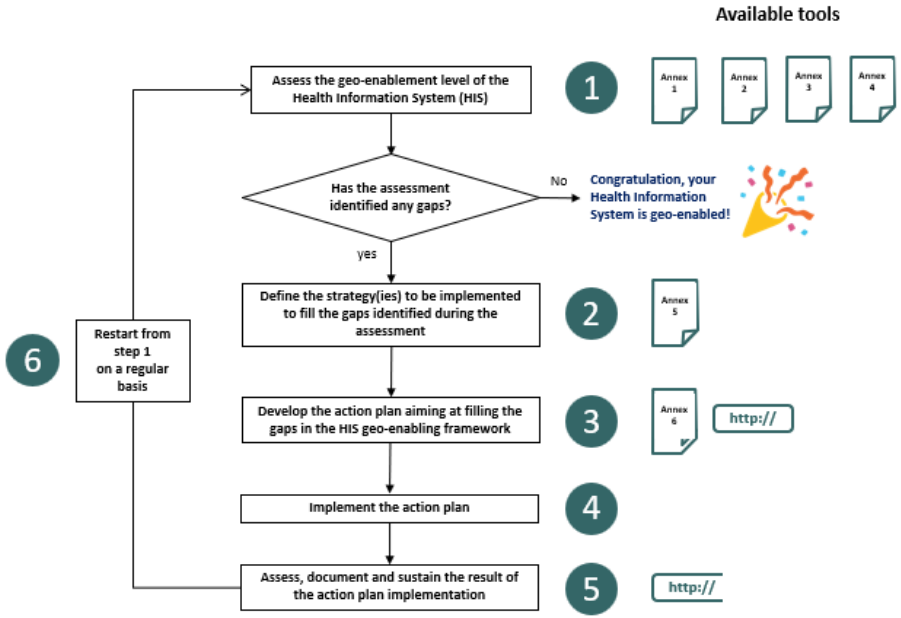
Action plan template

[1] https://www.healthgeolab.net/DOCUMENTS/HIS_geo-enabling_toolkit.pdf

The HIS Geo-enabling toolkit – Implementation process

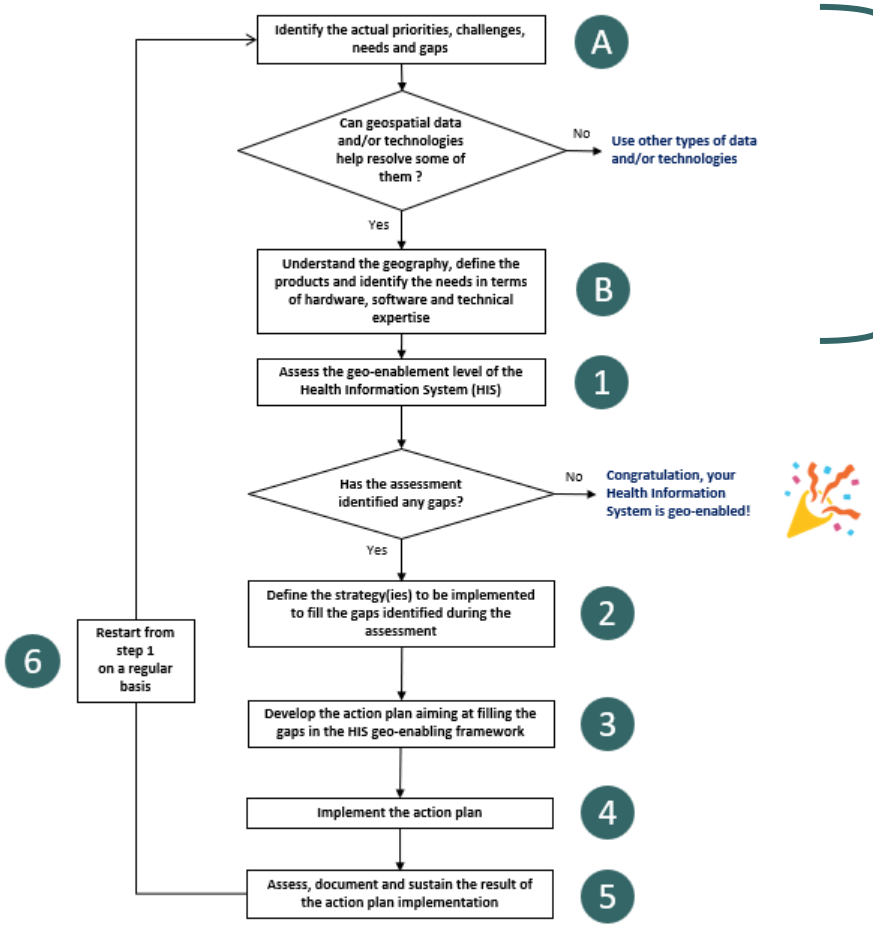


Geo-enabling the HIS



Loop in both cases

Geo-enabling a program or intervention



Two additional steps at the beginning of the process

Module 2 – «Homework »

- For participants from Ministry of Health programs/units **of Asia Pacific**: Complete the rapid HIS geo-enablement level assessment questionnaire if not already done (maximum 15 min)
- For other participants **from Asia Pacific**: Encourage your counterparts in the Ministry of Health to complete the questionnaire

https://tinyurl.com/4veevrkr

➡ The more programs we have, the more concrete and useful the rest of the training will be and the higher the possibility for each country to develop an action plan

➡ Thanks to APMEN's support will be provided to up to 3 countries of **Asia Pacific** after the training workshop to develop an action plan aiming at filling the gaps identified during the assessment

Programs/units having completed the questionnaire as of today

Country	HIS unit	Immunization	Malaria	Tuberculosis	HIV/AIDS	Other
Timor-Leste	■		■		■	
Afghanistan			■	■		
Bhutan			■		■	
Pakistan		■	■			
Papua New Guinea			■			Population and family health
Thailand	■		■			
Bangladesh			■			
Cambodia			■			
China			■			
Fiji	■					
Indonesia			■			
Malaysia			■			
Philippines			■			
Solomon Island			■			
Sri Lanka					■	

The number of programs/units having completed the questionnaire will be one of the criteria used for the selection of countries that will receive support to develop an action plan

Module 2 – Schedule and agenda

Schedule Module 2 3 July 2024 (Bangkok 12pm / Geneva 6am / Fiji 6pm)
15 min - Recap of Module 1 and agenda of Module 2
30 min - **Session 4**: In-country implementation of the HIS geo-enabling framework
30 min - **Session 5**: Result of the HIS geo-enablement level assessment for Asia and Pacific (priorities and challenges)
30 min - **Session 6:** Understand the geography of the program or intervention

➡ Implementation of the HIS geo-enabling framework

Thank you for your attention and see you all again soon!