Cartographic validation as a tool for the correct application of geographic intelligence in the Americas.

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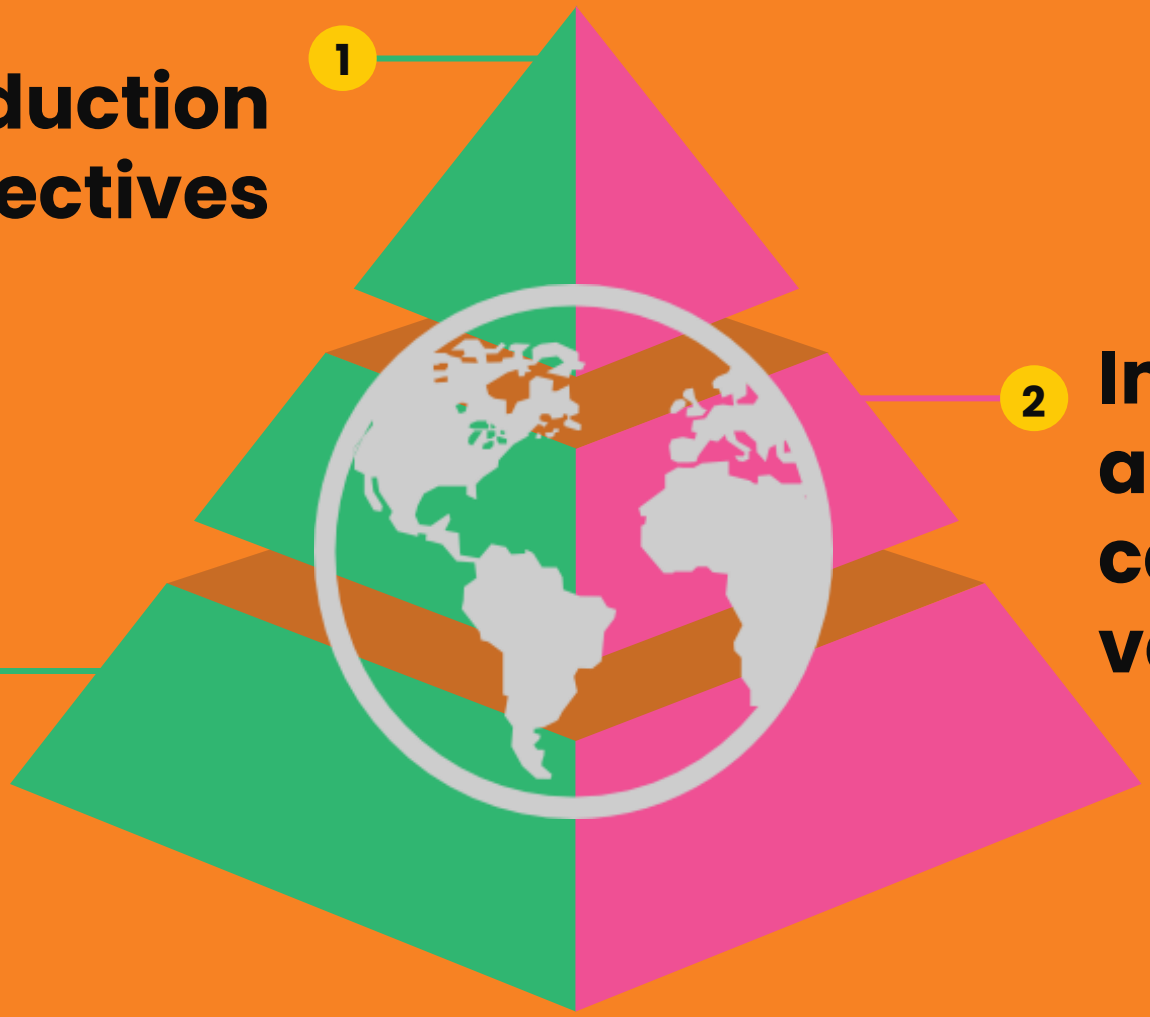
RIA

1 **Introduction and Objectives**



2 **Importance and application of cartographic validation**

3 **Case studies**

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1 Introduction and Objectives

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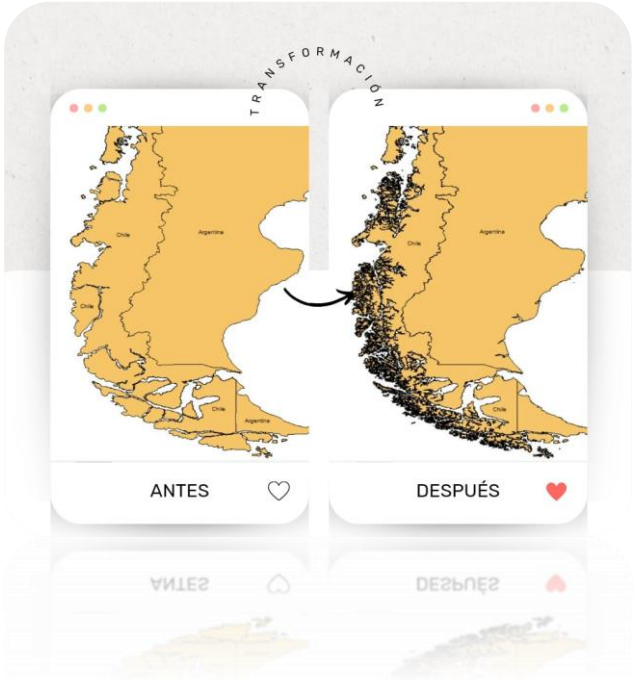
Consistency in Administrative Divisions: Geographic information at the country level ensures that boundaries and administrative divisions align with established systems, which facilitates decision-making and the development of coherent policies.

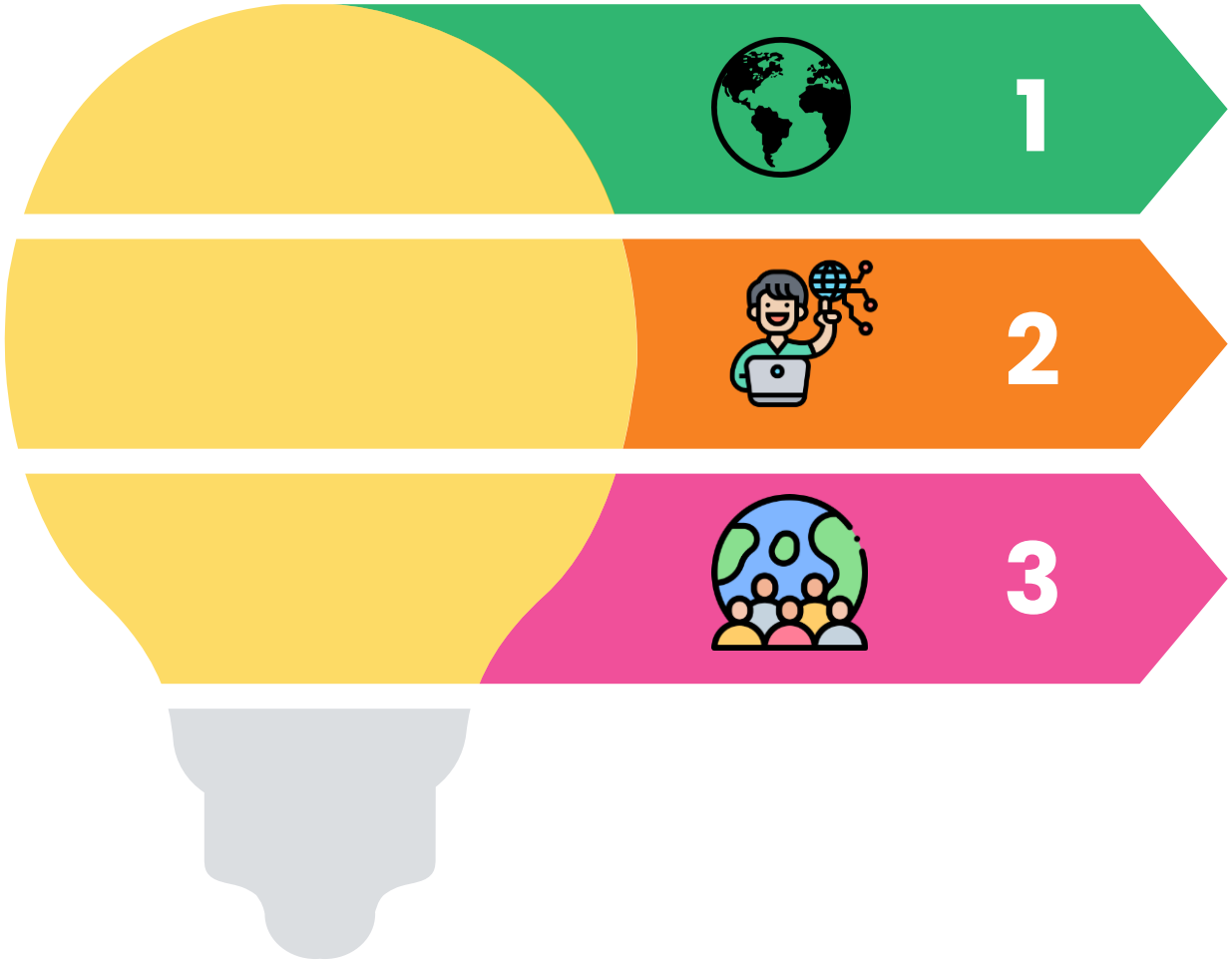


Support for Informed Decision-Making: The availability of accurate geographic information that is aligned with traditional administrative divisions enables governments, international organizations, and civil society to make informed decisions based on reliable data.

Promotes Comparability and Access to Integrated Information: The use of common standards and access to integrated geographic information encourages data comparability among countries and facilitates access to this information to support initiatives at national, regional, and global levels

Eases PAHO's Data Management in CIM and EIH: Geospatial information is crucial for the management of immunizations, emergencies, and prevention, as it provides a solid foundation for the planning, implementation, and monitoring of strategic actions.

Benefits of Standardization



1 To be updated according to the country's information and its own coding in the territorial structure.

2 To endure over time for improved analyses of coverage, surveillance, emergencies, among other public health analyses.

3 That the borders of countries align with the spatial structure, including capes, islands, and details such as lakes among others, for better disaggregation.

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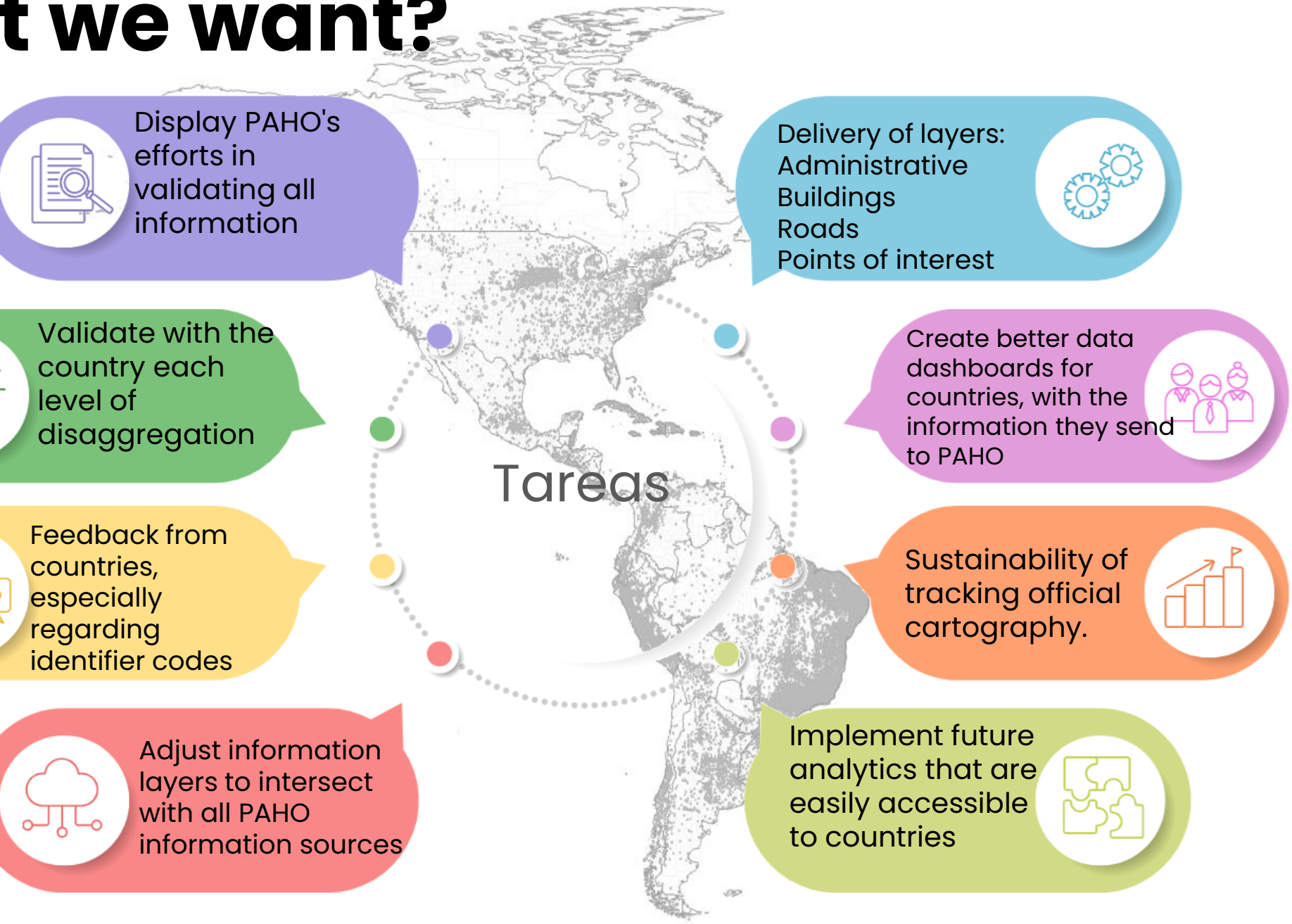
What we want?



Display PAHO's efforts in validating all information

Delivery of layers:
Administrative
Buildings
Roads
Points of interest

Validate with the country each level of disaggregation

Create better data dashboards for countries, with the information they send to PAHO

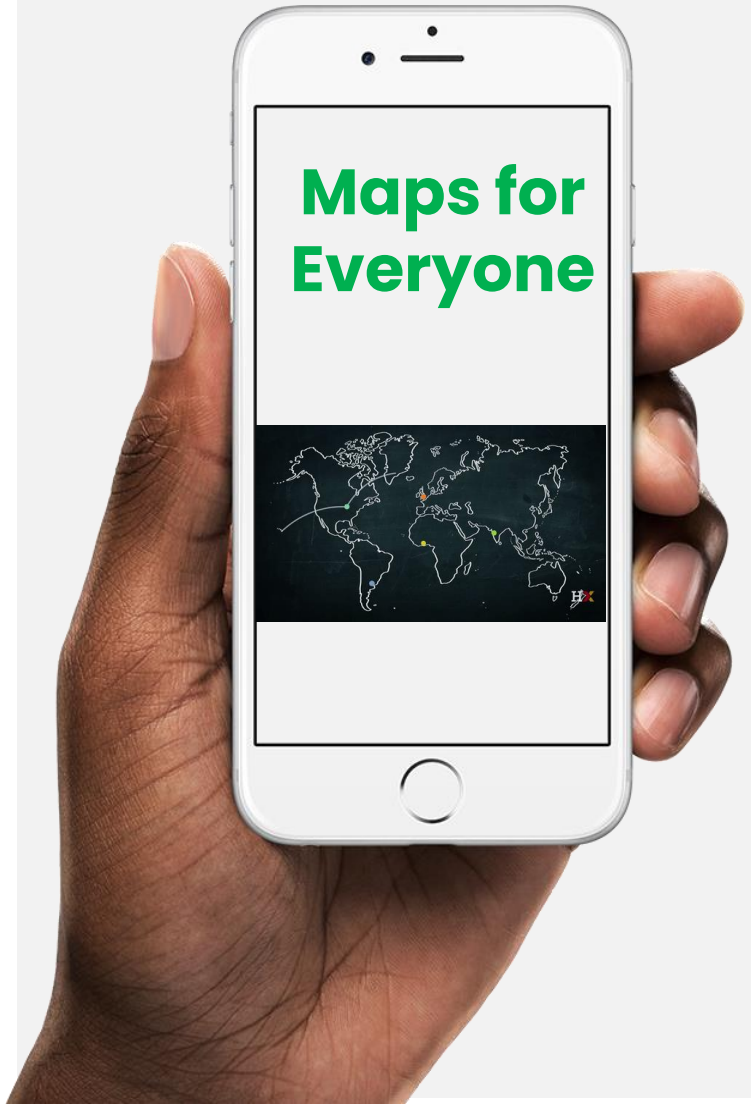
Feedback from countries, especially regarding identifier codes

Sustainability of tracking official cartography.

Adjust information layers to intersect with all PAHO information sources

Implement future analytics that are easily accessible to countries

Objective



- To provide participants with a comprehensive understanding of the importance and methods of cartographic validation in the context of geographic intelligence. This is to ensure the accuracy and reliability of geospatial data and its impact on public health decision-making, with an emphasis on immunizations.

2

Importance and Application of Cartographic Validation

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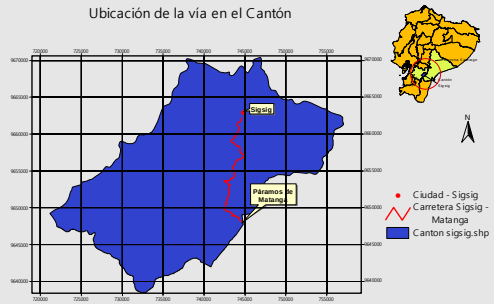
¿What is Digital Cartography for?

Maps ensure uniformity and facilitate the organization of the census and information on vaccine coverage, surveillance, and emergencies

(before).

Maps facilitate the collection of data and coverage for the census, vaccination, surveillance, emergencies, and others

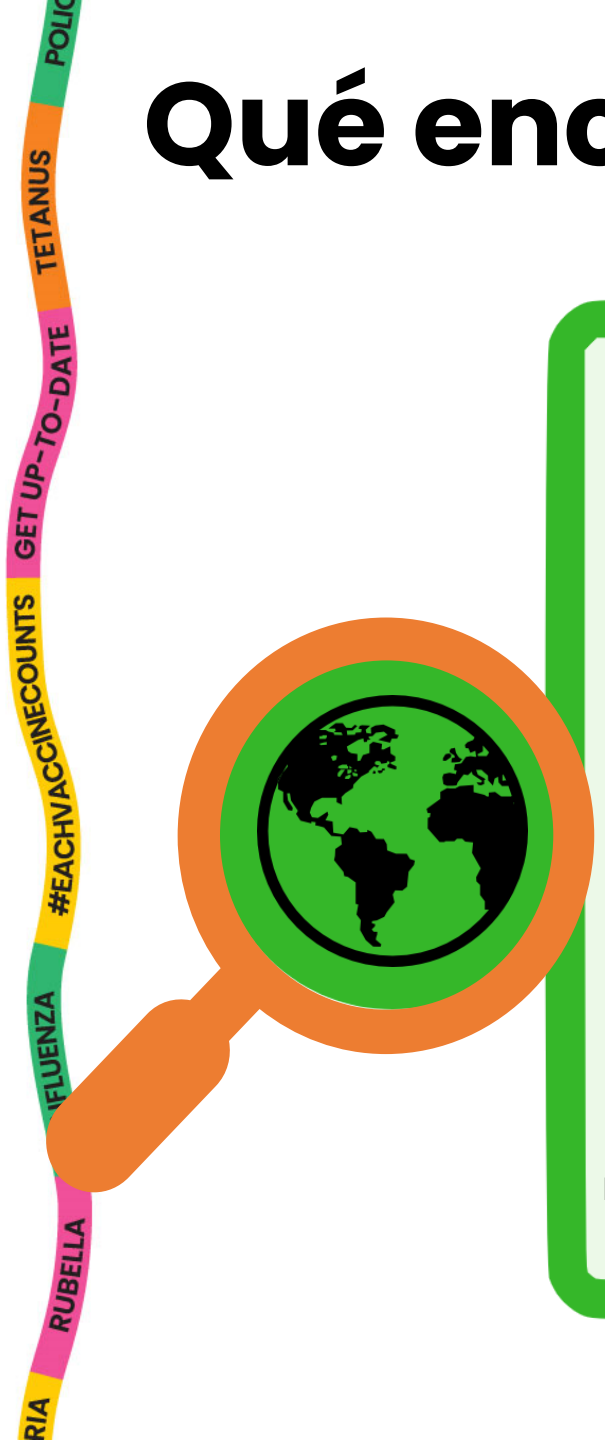
(during).



Maps assist in the presentation, analysis, and dissemination of results from the census, vaccination campaigns, surveillance, emergencies, and other related activities

(after).

Qué encontramos?



1

PROBLEMS AT THE EDGES AND UNION OF GEOGRAPHIC UNITS

It was identified that countries had issues with their borders and disaggregations

All the physical cartography of 54 countries in the Americas region is corrected to correspond with official information and **match** with Google Earth data.

2

DISCREPANCY BETWEEN ISO 3 CODES AND COUNTRY CODES

A discrepancy was found between the coding and names of administrative units 1, 2, and 3

Validation is done with the national report from the statistics and geography institutes of each country so that the codes of the administrative units at the **first, second, and third** levels match the country.

3

NO AVAILABILITY OF OTHER MAPS FOR THE COUNTRY

There is no availability of other geographic information for the countries

The countries do not have easily accessible spatial information to apply in vaccination campaigns, micro-planning, surveillance, and emergencies.

Problems at the edges and the joining of geographic units

1

But this is how it looks.
We show you:

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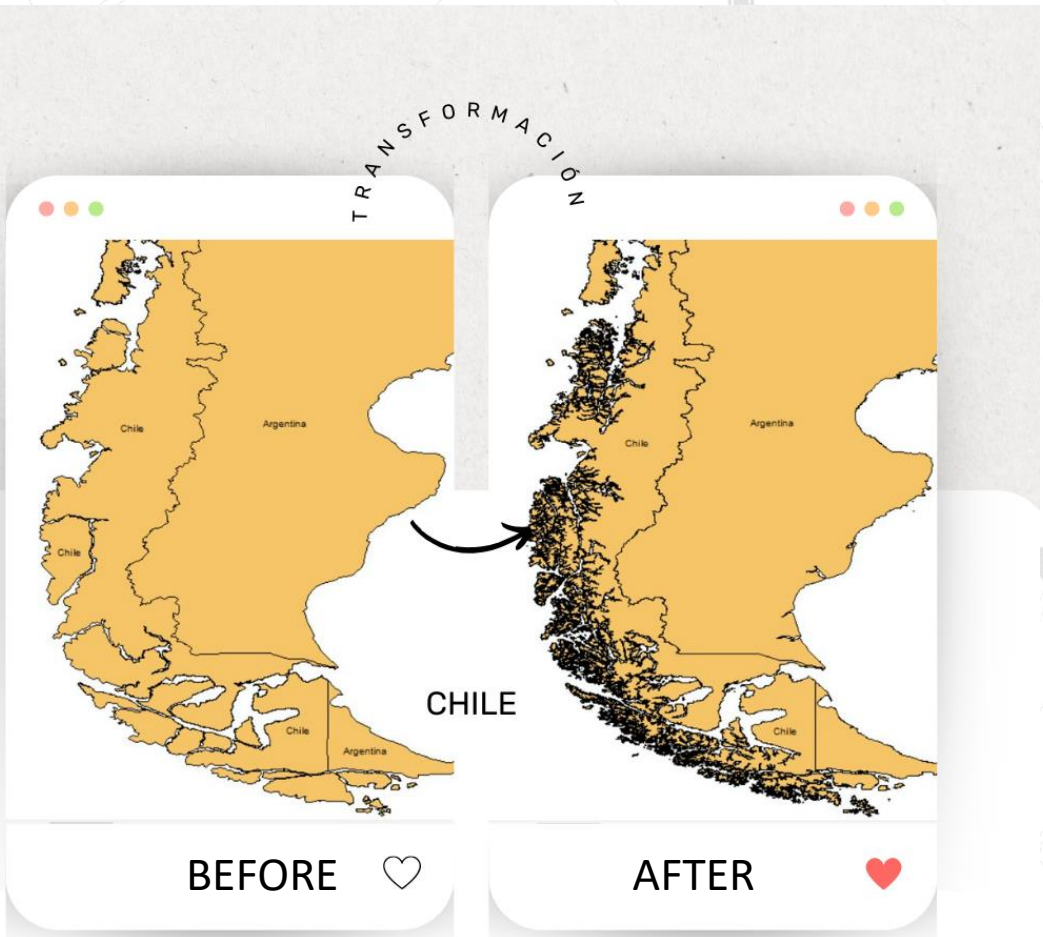

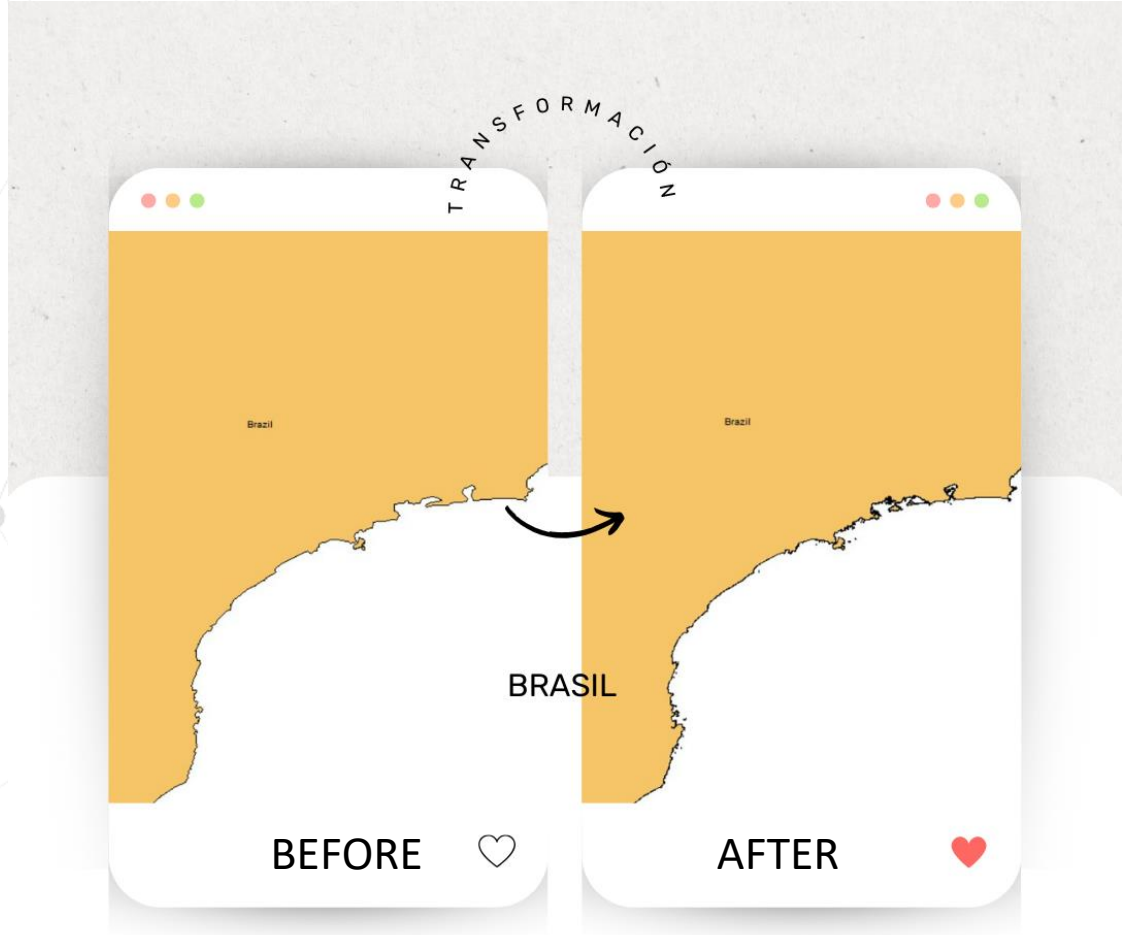

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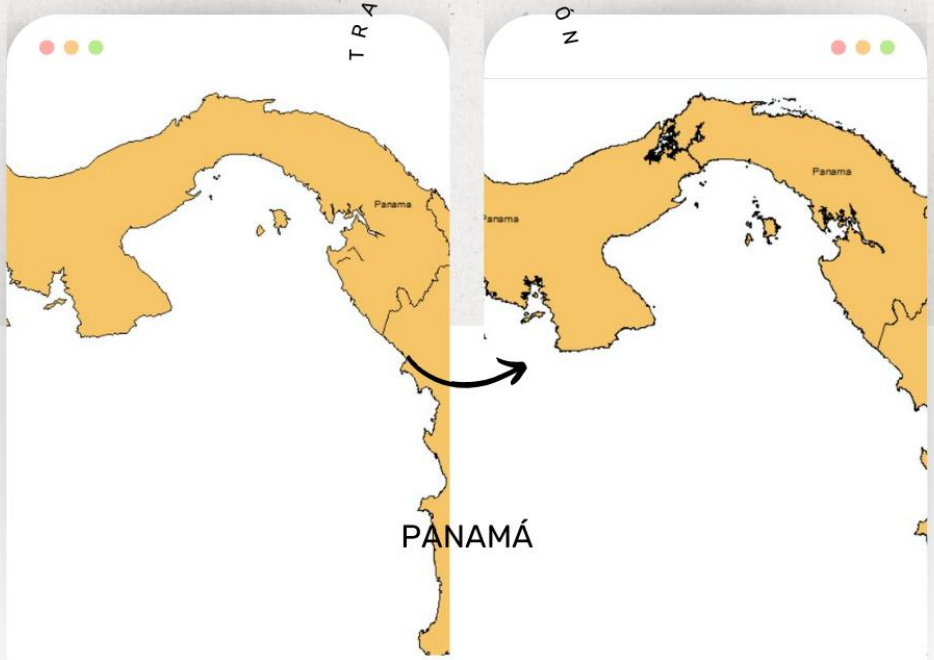
TRANSFORMACIÓN

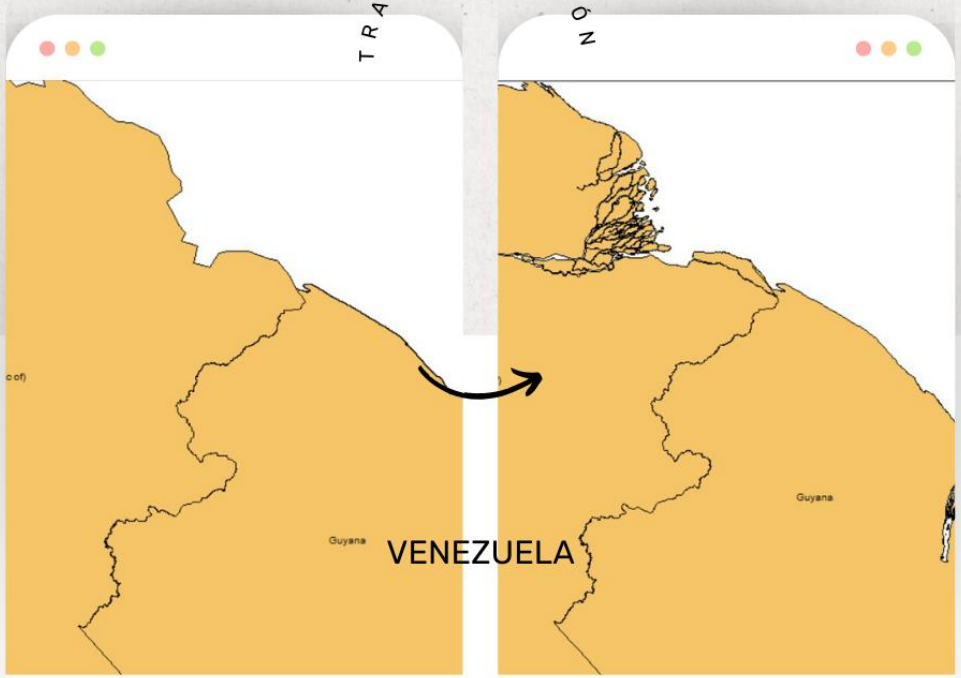


PANAMÁ

BEFORE ♡

AFTER ♥

TRANSFORMACIÓN



VENEZUELA

BEFORE ♡

AFTER ♥

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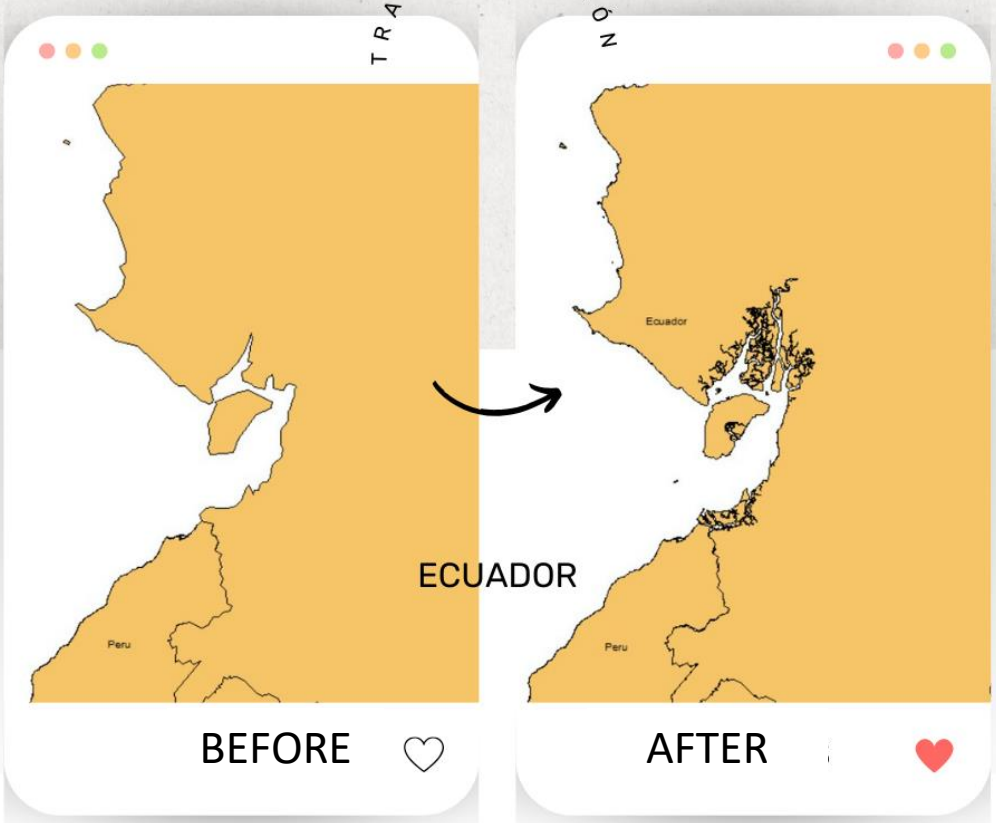
TRANSFORMACIÓN



ECUADOR

BEFORE ♡

AFTER ♥

TRANSFORMACIÓN

ESTADOS UNIDOS

BEFORE ♡

AFTER ♥

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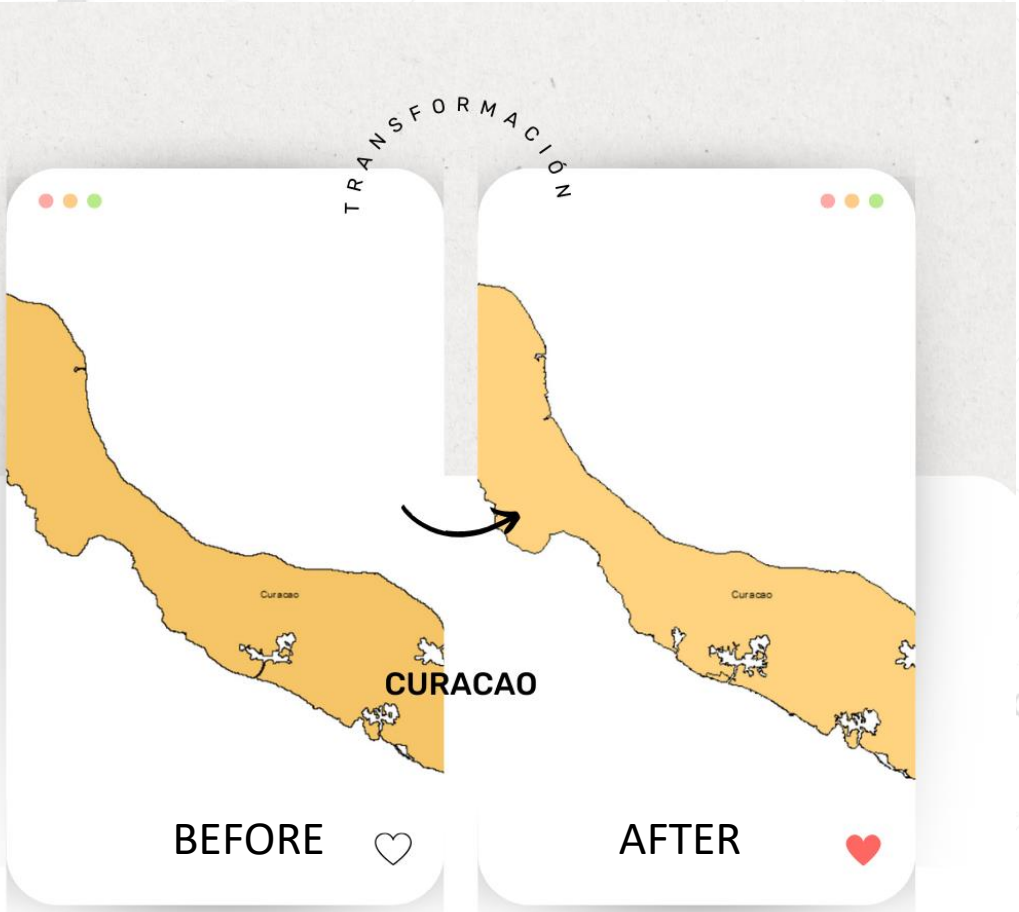

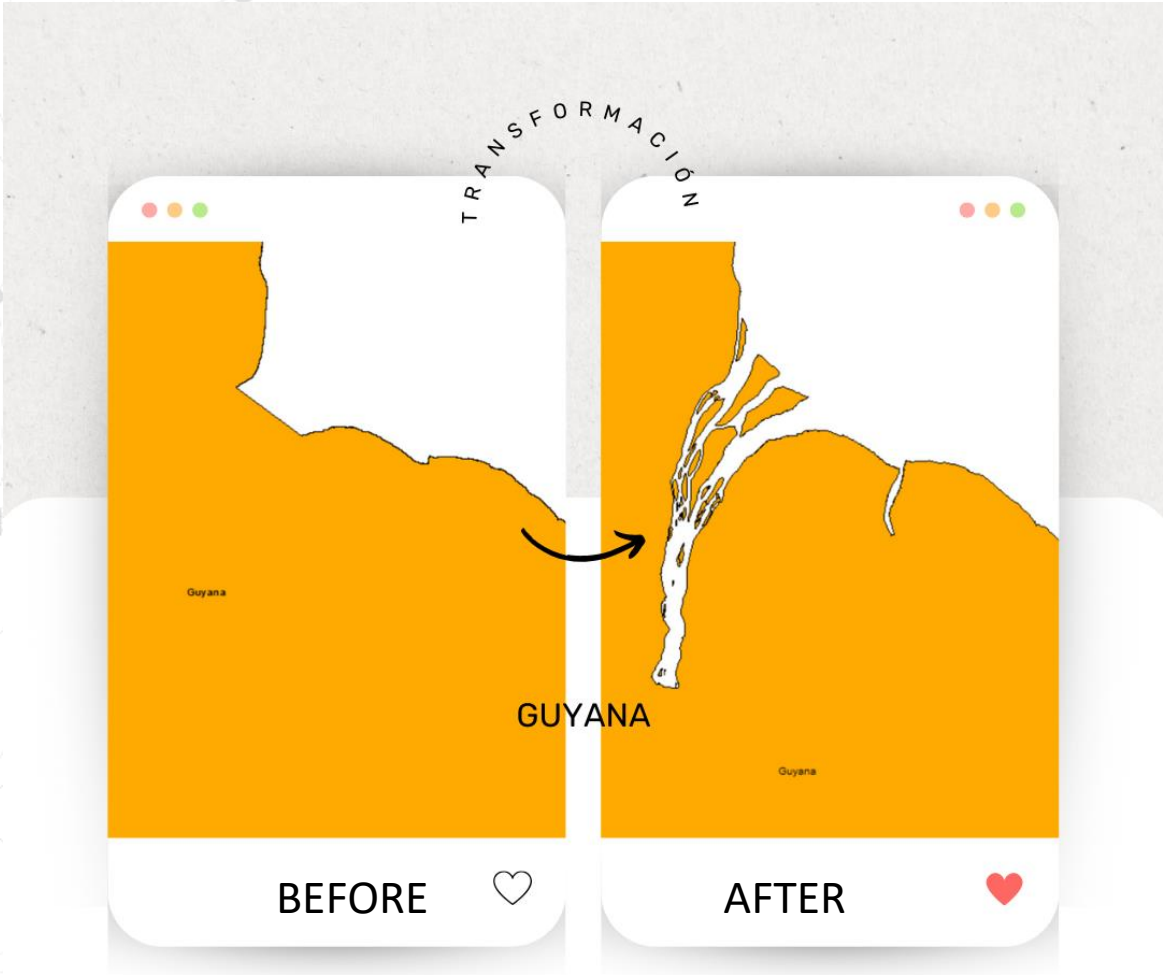

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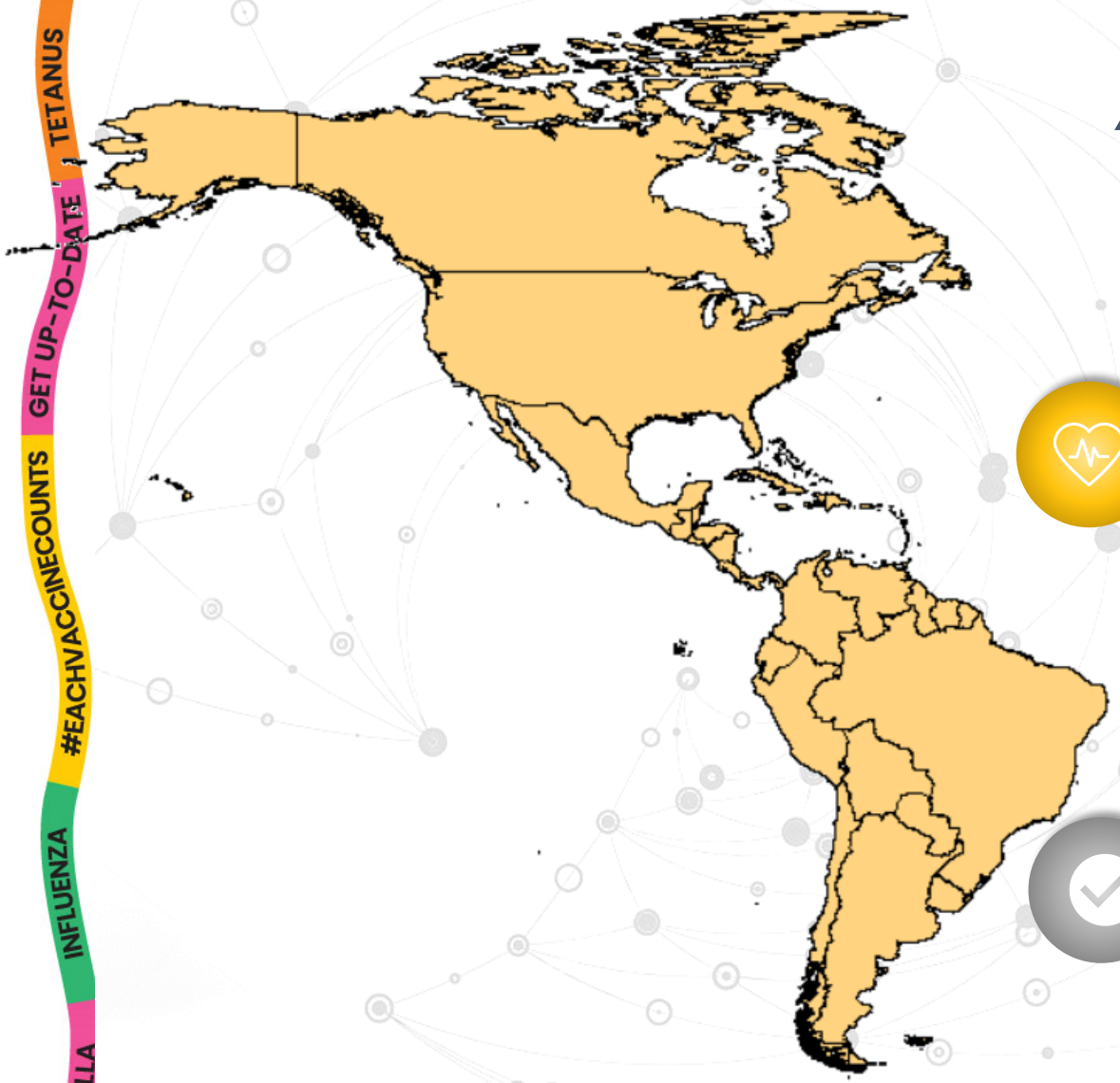

- Administrative Level 0: Country border
- Administrative Level 1
- Administrative Level 2

Start August 2023

ADM0 first level joint. Country border January 2024

Completion January 2024.

Validation **pending** ADM1, ADM 2 and ADM 23

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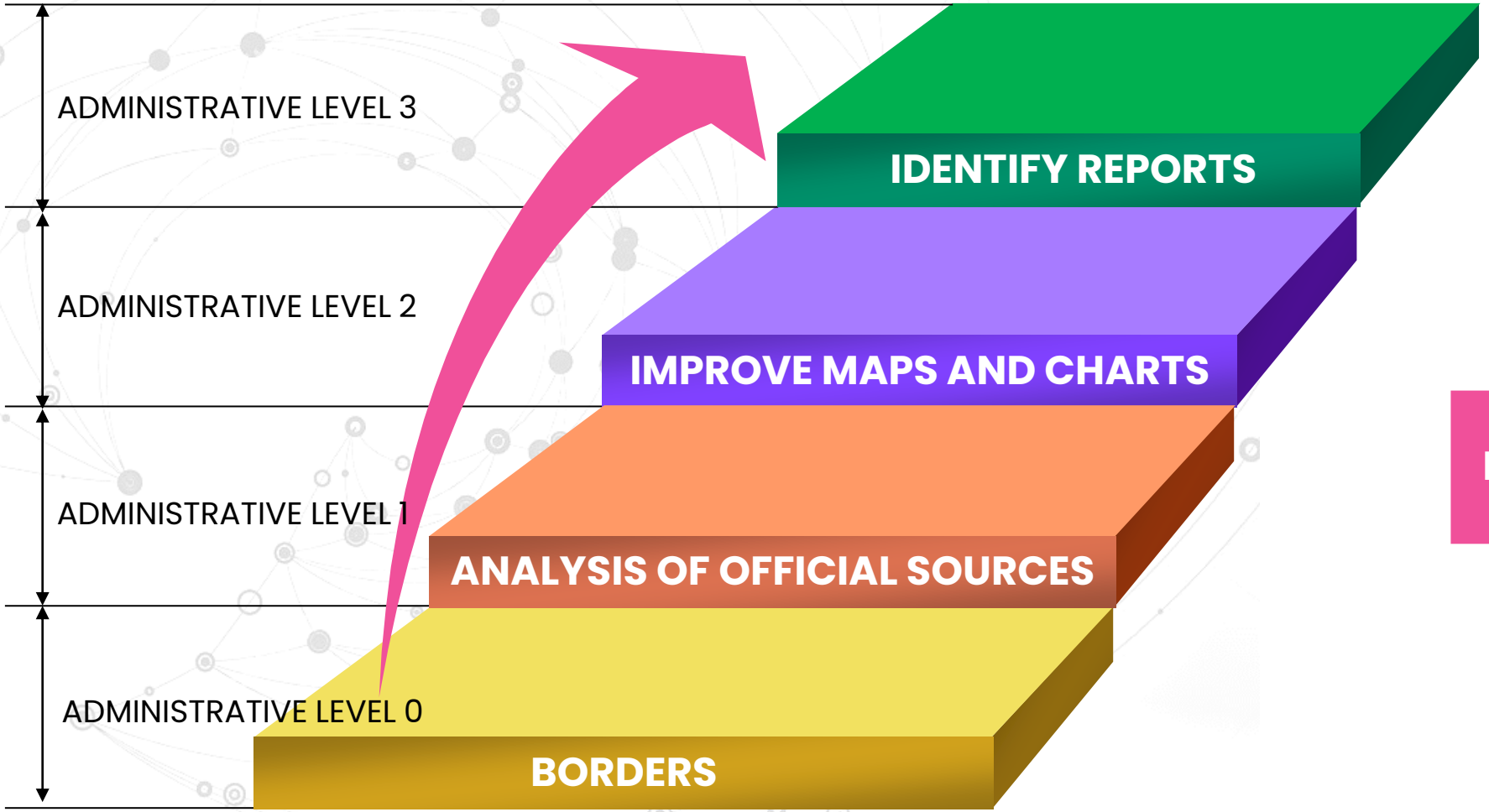
Discrepancy between ISO 3 codes and country codes

2



Example:

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Discrepancy between ISO 3 codes and country codes

2

14

Countries report vaccination coverage **equal to the data table** available in the official information

4

Countries have **one or two** differences between geographic units

24

Countries, have differences between reports in **coverage by different codes, or union of geographic units**.

Example:

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Discrepancy between ISO 3 codes and country codes

2

Región
Provincia
Comuna

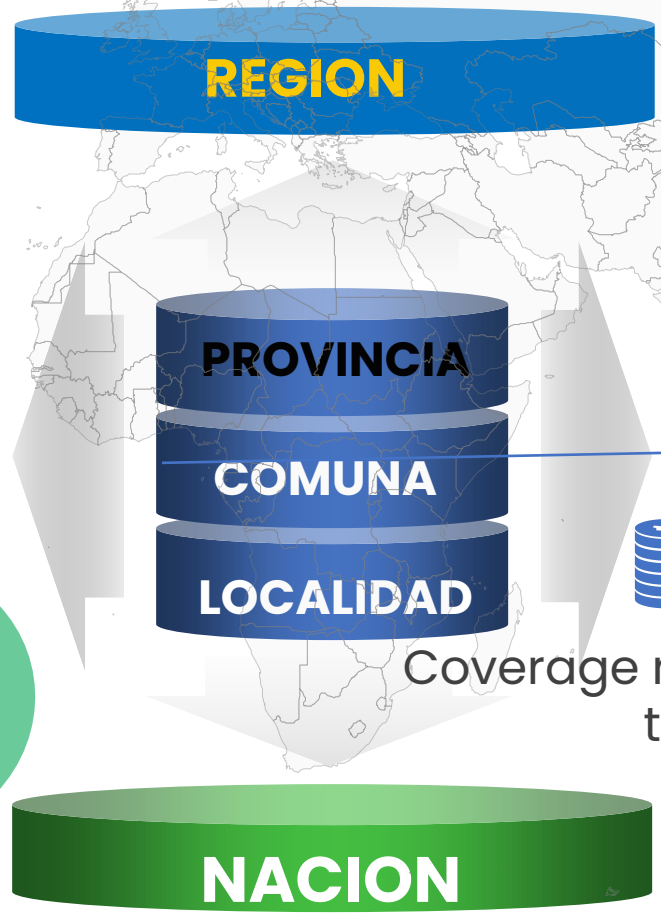
1 0 1 0 1

CODIGO UNICO NACIONAL

Cinco (5) códigos

CL_LL_101

CODIGO UNICO PAHO - GIS_CODE ISO



Coverage report at this level.

CHILE

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Political and administrative division - Chile

Regionalized Map of Chile

Discrepancy between ISO 3 codes and country codes

2

FIRST LEVEL COVERAGE REPORT

The totals match but the unit names are different from those of the country.

Do not match

Antigua y Barbuda

CODES AND NAMES IN PAHO

Nombre	Código
Saint George	AG-03
Saint John	AG-04
Saint Mary	AG-05
Saint Paul	AG-06
Saint Peter	AG-07
Saint Philip	AG-08
Barbuda	AG-10
Redond	AG-11

CODES AND NAMES IN COUNTRY

Nombre
All Saints
Barbuda
Villa
Brownes Avenue
Eastern Area
Grays Farm
Northern Area
Southern Area

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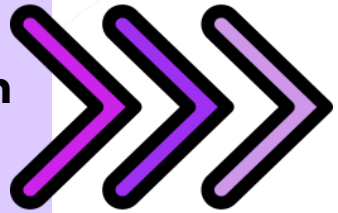
Homework for the countries...

Example of how it would go

Review the tables we will send to the country to validate both name and code found.



N1_Código (alpha2)|	N1_Nombre	N2_Código (alpha3)	N2_Código (alpha5) (concact 2 +3)	N2_Nombre	N2_TIPO
05	ANTIOQUIA	001	05001	MEDELLÍN	Municipio
05	ANTIOQUIA	002	05002	ABEJORRAL	Municipio
05	ANTIOQUIA	004	05004	ABRIAQUÍ	Municipio
05	ANTIOQUIA	021	05021	ALEJANDRÍA	Municipio
05	ANTIOQUIA	030	05030	AMAGÁ	Municipio
05	ANTIOQUIA	031	05031	AMALFI	Municipio
05	ANTIOQUIA	034	05034	ANDES	Municipio
05	ANTIOQUIA	036	05036	ANGELÓPOLIS	Municipio
05	ANTIOQUIA	038	05038	ANGOSTURA	Municipio
05	ANTIOQUIA	040	05040	ANORÍ	Municipio
05	ANTIOQUIA	042	05042	SANTA FÉ DE ANTIOQUIA	Municipio
05	ANTIOQUIA	044	05044	ANZÁ	Municipio

Tracking matrix for future updates

Homework for the countries...

Example of how it would go

Country	Country Code	N0_ISO 3166-1 (alpha2)	N0_ISO 3166-1 (alpha3)	N0_ISO 3166-1 (numérico)	N0_COI	N0_Fips 10	N0_Placa vehículo	N0_Domain	N0_País
Argentina	ARG	AR	ARG	32	ARG	AR	RA	.ar	Argentina

N1_Total	N1_Nombre	N1_Estructura	N2_Total	N2_Nombre	N2_Estructura
24	Provincia	Dos códigos alfanumericos	527	Departamento	Tres códigos alfanumericos en inicio, pero se consigna como Cinco códigos alfanumericos N1+N2

URL de información de División político Administrativa	Ultimo año vigente	Palabra clave en buscador
https://www.indec.gob.ar/ftp/cuadros/menusuperior/clasificadores/anexo2_resol55_2019.pdf https://sitioanterior.indec.gob.ar/nivel4_default.asp?id_tema_1=1&id_tema_2=39&id_tema_3=121	2019	Códigos de las unidades geográficas o unidades administrativas

Tracking matrix for future updates

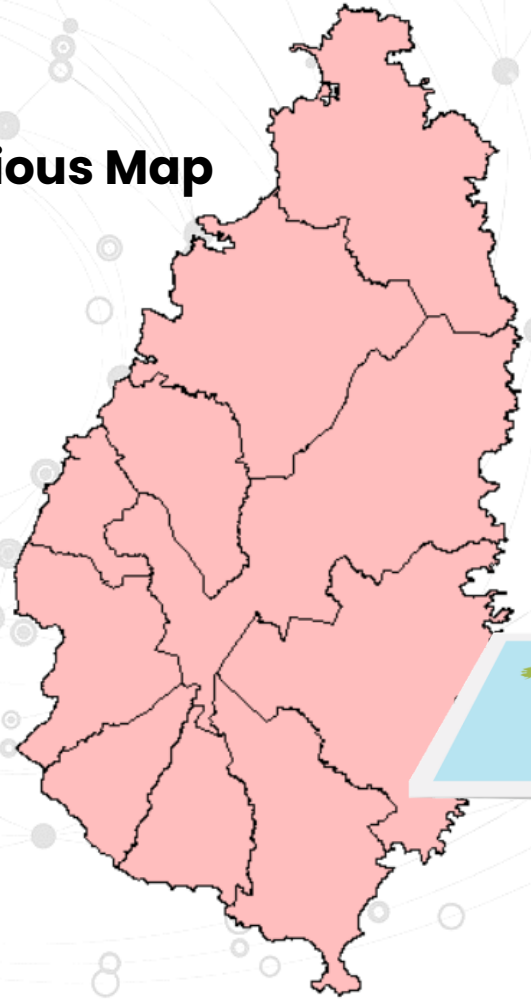
Homework for the countries...

Example of how it would go

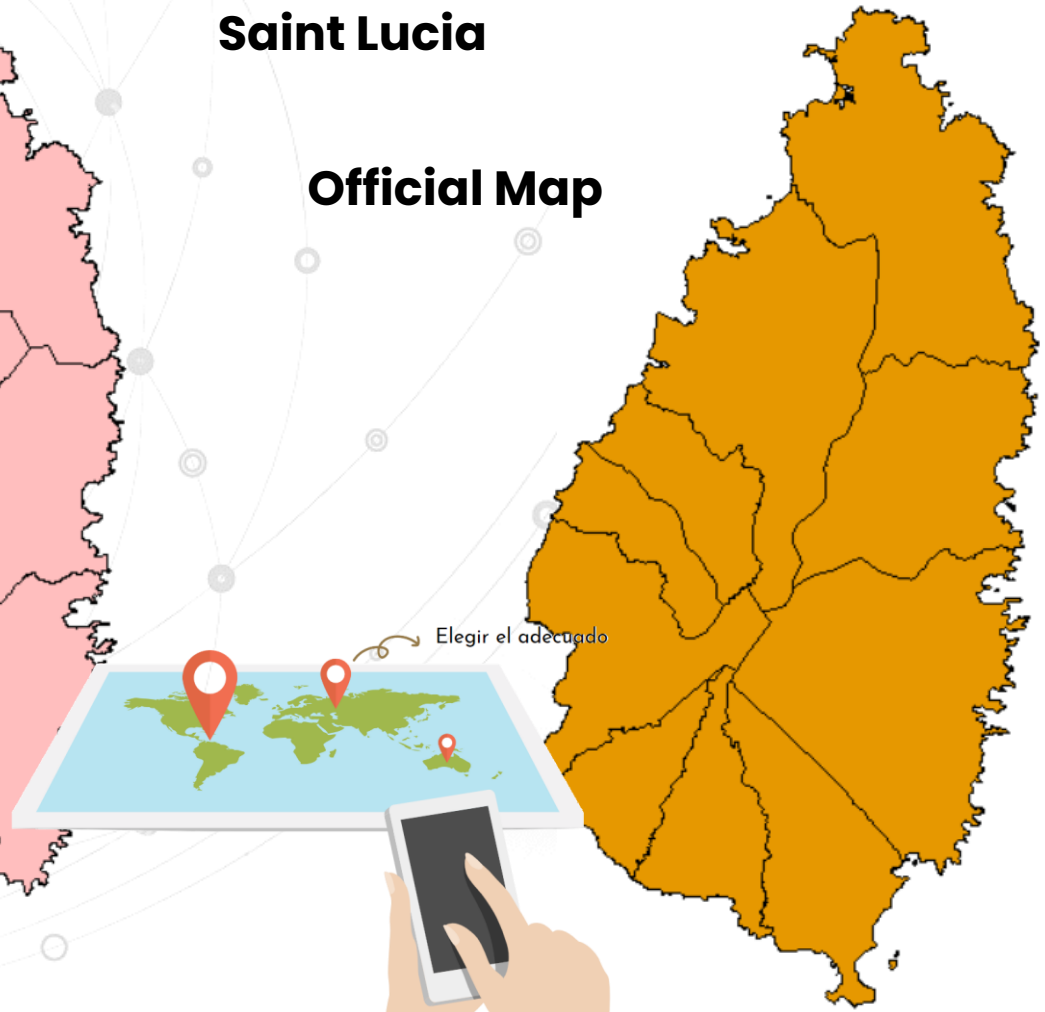
Reach agreements to join geographic units, in exceptional cases.

Saint Lucia

Previous Map



Official Map



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Homework for the countries…

Define new report sheet structure in JRF with names and codes

Example of how it would go

~~Agregar más~~ filas de acuerdo al número de municipios, distritos o similar que el país tenga			
NOMBRE de DEPARTAMENTO/ ESTADO/PROVINCIA	**CODIGO GIS de DEPARTAMENTO/ ESTADO/PROVINCIA**	**NOMBRE de Municipio/Cantón/Distrito**	**CODIGO GIS de Municipio/Cantón/Distrito**
(Adm1_ISO_N)	(Adm1_NAT_C)	(Adm2_ISO_N)	(Adm2_NAT_C)
01	BOCAS DEL TORO	BOCAS DEL TORO	0101

Improved ease of location for both the country and PAHO when using maps in Power BI dashboards, Tableau, R, and programs such as ArcGIS and QGIS.

No other maps are available for the country

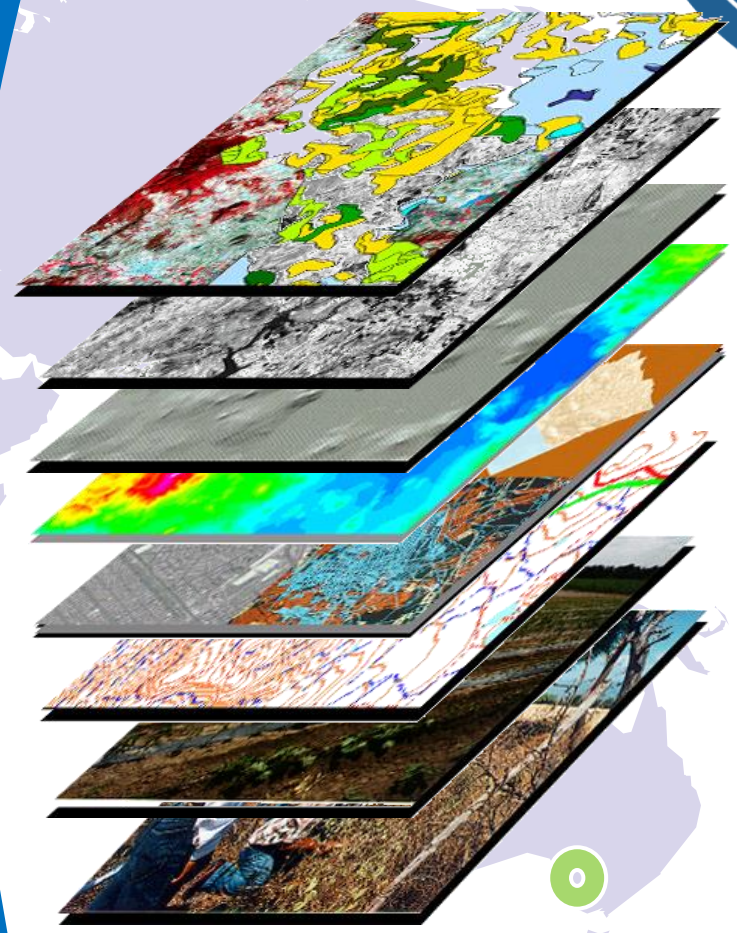
3

Vaccination Points

Transportation network

Population

Buildings



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Data already available

3

healthsites.io

Geolocated Health Facilities Data initiative

Vaccination Points

Transportation network

HOT Humanitarian OpenStreetMap Team

OpenStreetMap

world pop

GRID3 GEO-REFERENCED INFRASTRUCTURE AND DEMOGRAPHIC DATA FOR DEVELOPMENT

dasymetric population

Buildings

Polygon with national and subnational boundaries

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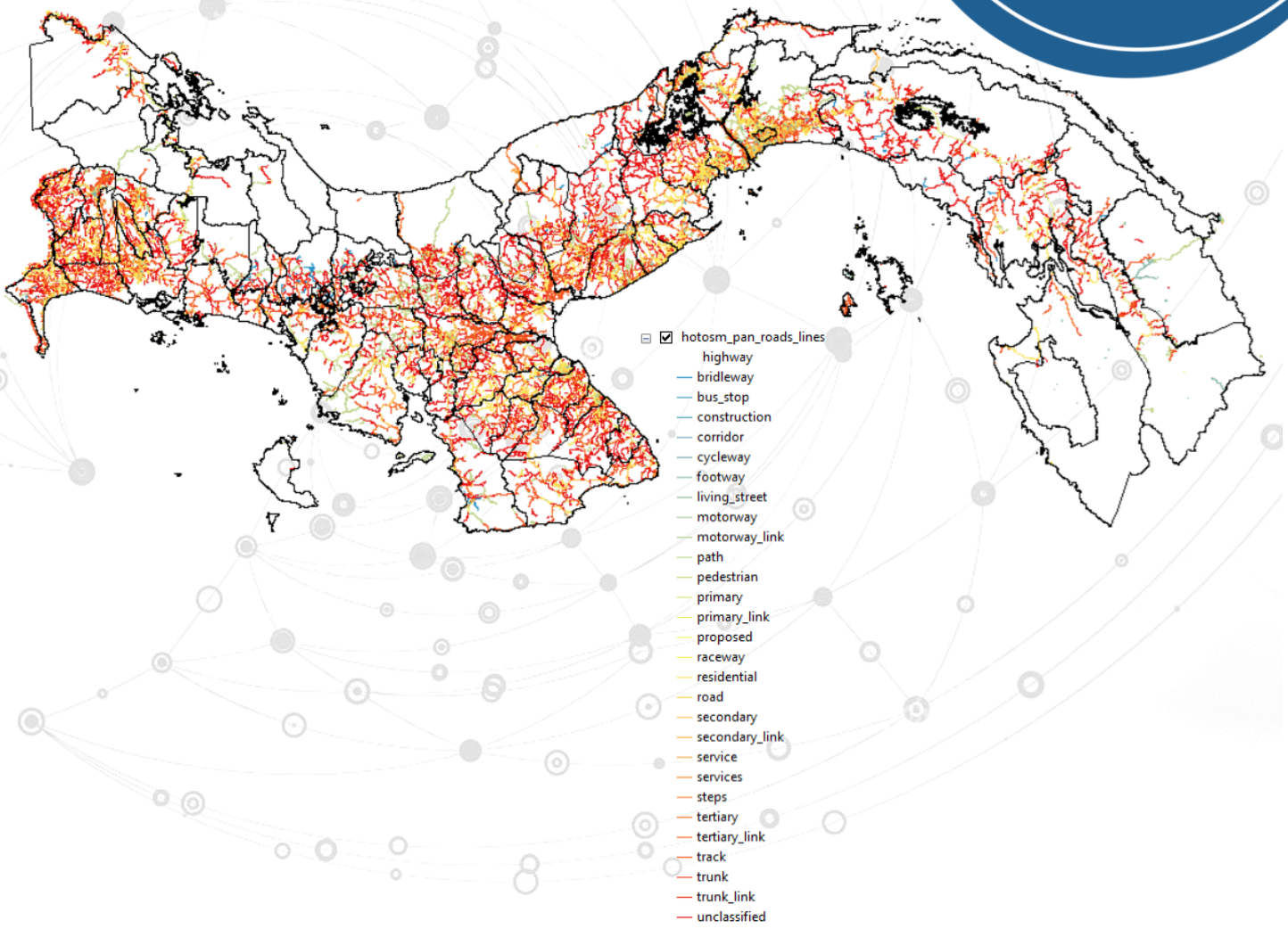
Transportation network

3

OpenStreetMap's Roads (Example Panama) initiative that provides support to countries to develop:

- **Improved ways of location** and proximity to vaccination points from main roads to achieve better access.
- **OpenStreetMap:** A reliable source with updated data on roads, facilitating the planning of accessibility at the regional level with permanent updating.



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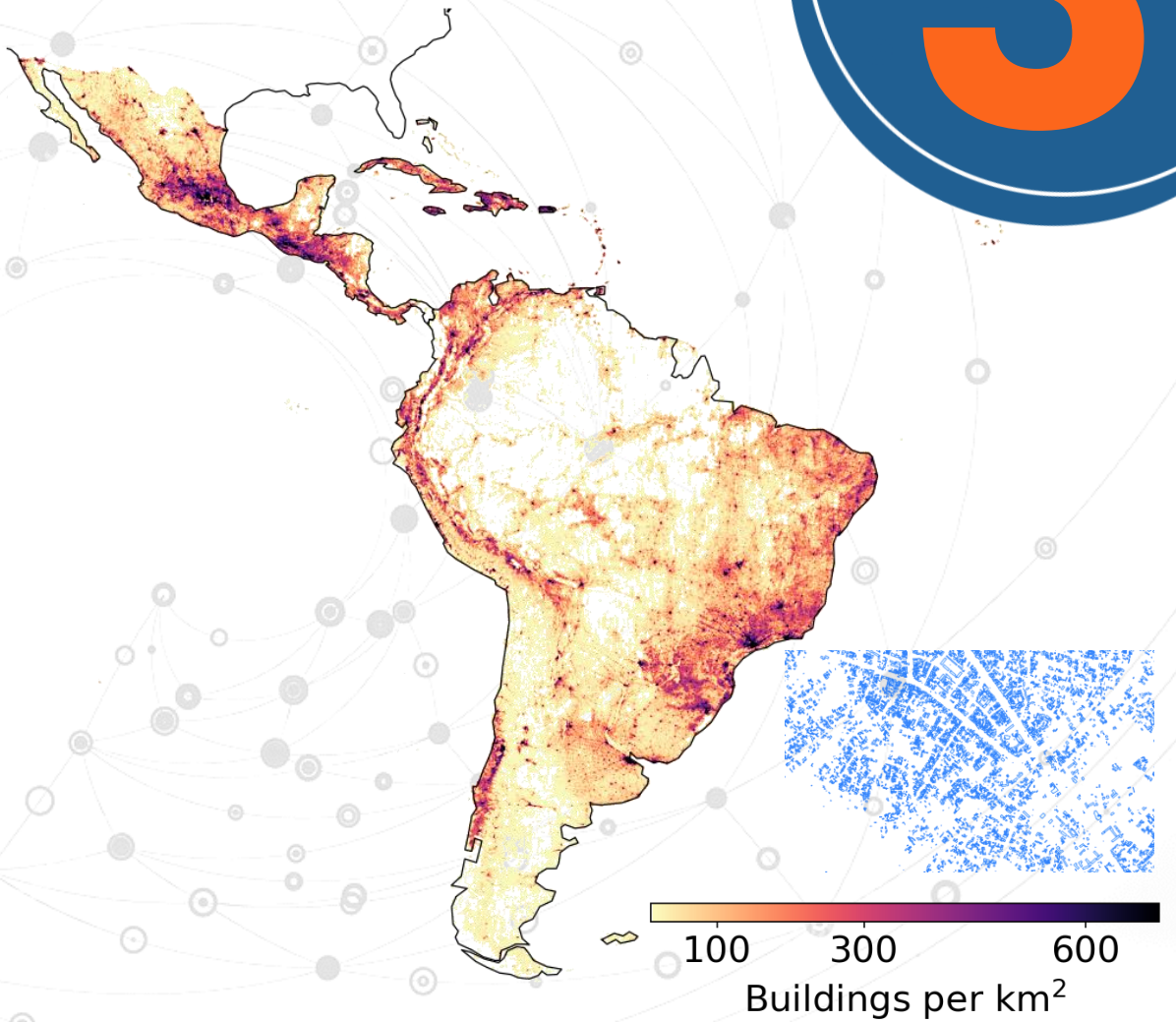
Buildings

3

The **Buildings** initiative provides support to countries to develop:

- **Humanitarian response:** To plan the response to a flood, drought or other natural disaster, it is useful to be able to assess the number of buildings or homes affected and, to estimate the number of buildings in a hazard zone.

- **Vaccination planning:** Knowing the population density and settlements helps to anticipate vaccine demand and the best locations for facilities.



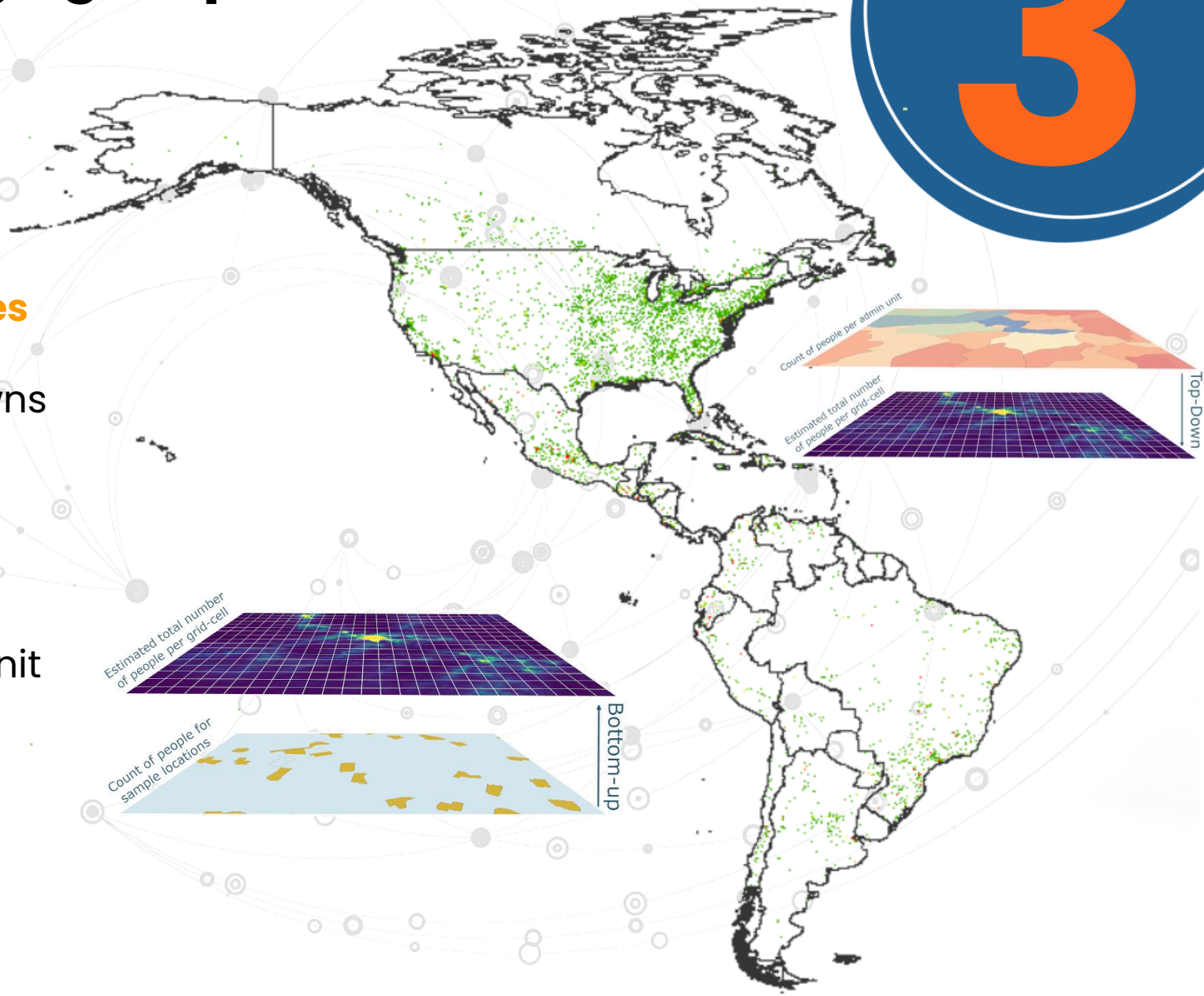
Population: Even by age group and sex

3

The **Population** initiative provides support to countries to develop:

- **Coherent and complete estimates** for each year from 2000-2020 for each country, including breakdowns by age and gender.

- **It maintains "official" population estimates** at the administrative unit level, as well as available adjustments to match the United Nations national estimates.



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Micro-censuses, environment, emergencies

Micro-planning for vaccination.

Epidemiological Surveillance of vaccine-preventable diseases.

3

Case studies

Application Microcensus

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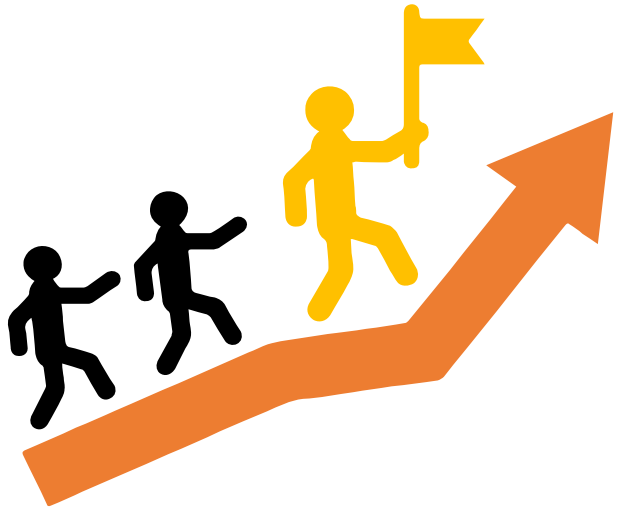
Goals and objectives

Goal : To provide an accurate estimate of the size of Bolivia's population by sex and age group.

Objectives:

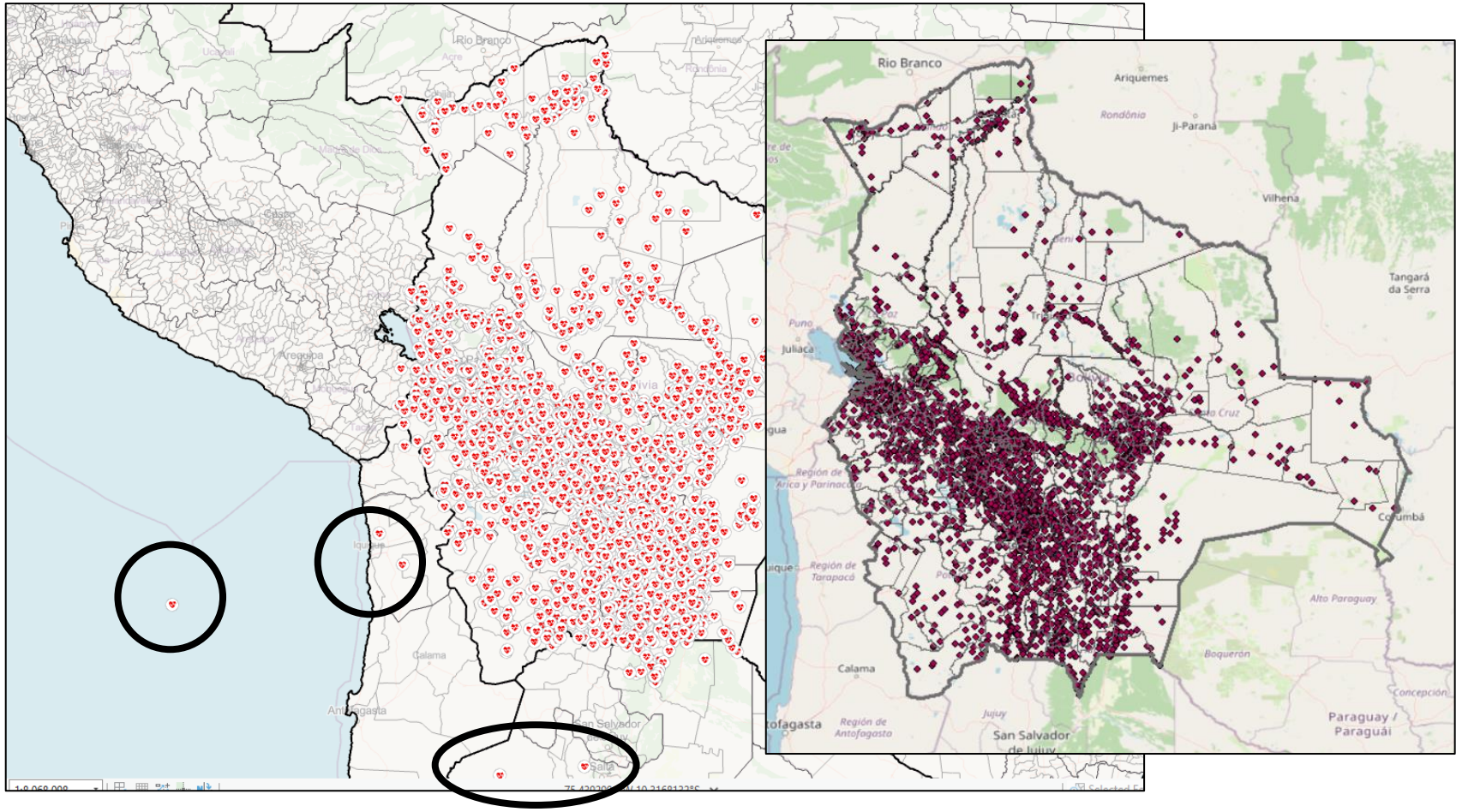
- To estimate the size of the national population living in the catchment area of each vaccination site within the territory of Bolivia.
- Validate the accuracy of the population estimates generated by PAHO by comparing them with the results of a house-to-house microcensus within 5 municipalities selected by the Bolivian Ministry of Health.
- Validate or adjust the micro-plans of the national immunization program to ensure an equitable distribution of resources during vaccination operations.

Steps taken



1. Review of health points and make the final ranking. The country indicates that they are at level 680 after review. .
2. Identify estimated population distribution using geospatial approaches population under 5 years old according to WordPop satellite images
3. Map all the streets in the country, separating primary, secondary and third roads, according to the country's working scheme.
4. Determine the closest distance from a vaccination point to a primary, secondary and tertiary road.
5. Application of techniques to achieve the objective of locating specific areas for the microcensus, taking into account logistics.
6. List the regions to carry out the microcensus and by vaccination points.
7. Verify selected municipalities and select building and/or houses to visit for estimation of people in the field
8. Implementation of the microcensus

1. Mapping and validating vaccination sites



Validate the geographical coordinates of each vaccination site in collaboration with the Bolivian Ministry of Health.

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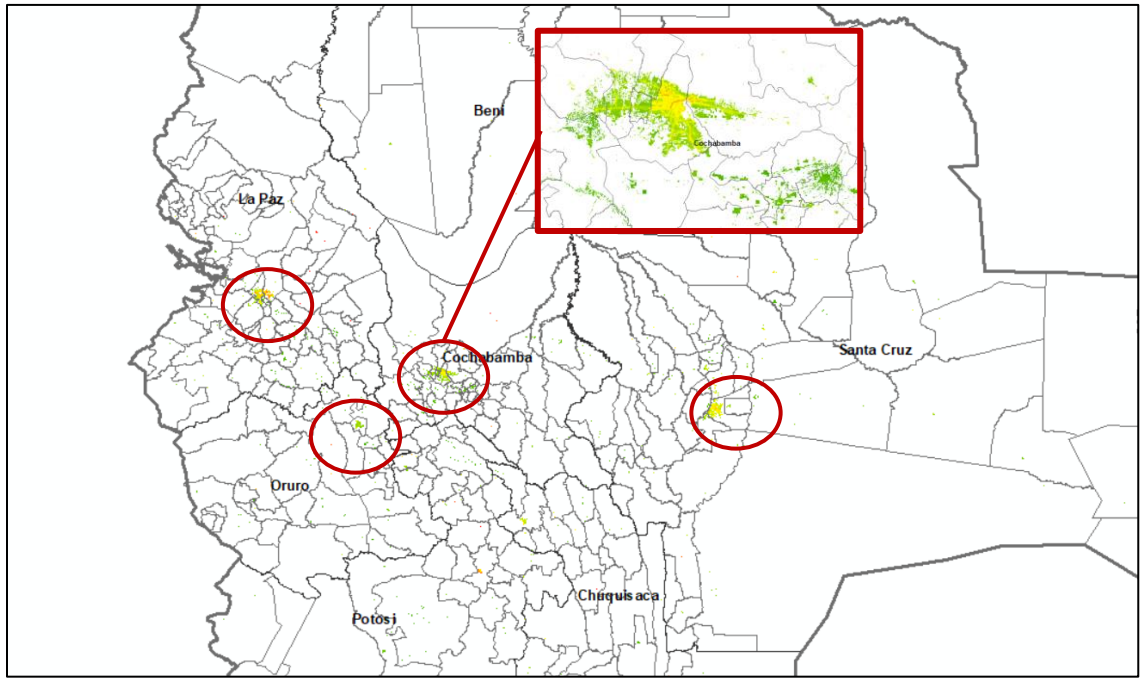
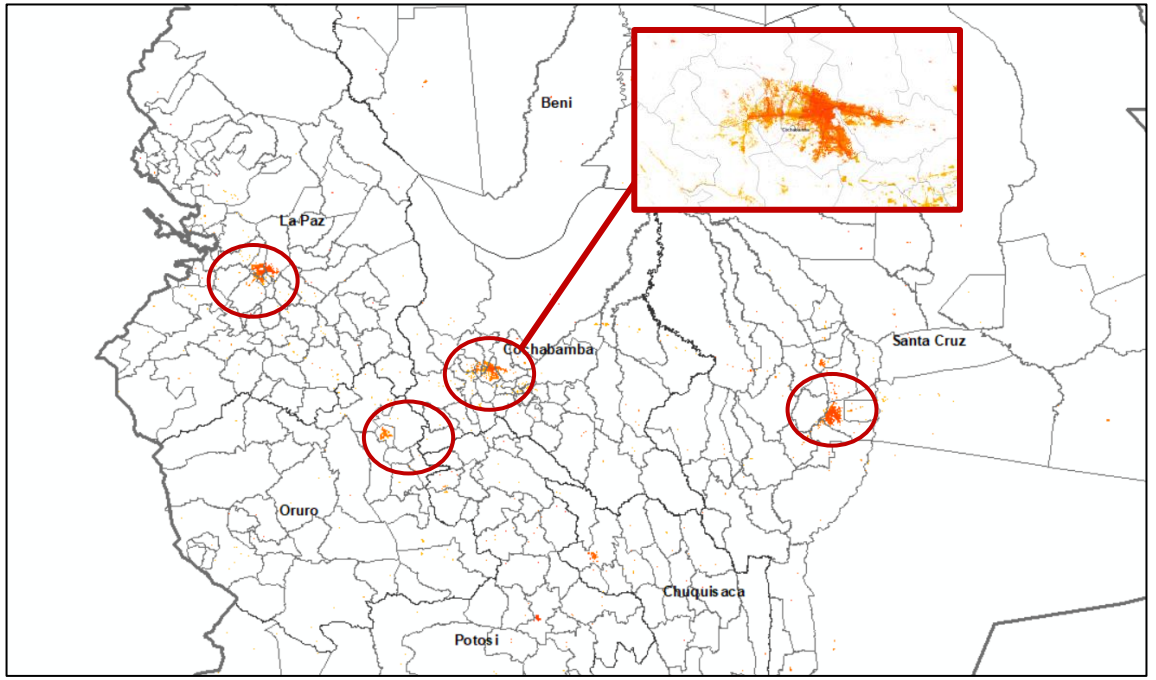
2. Mapping population density

Total population



Population under 5 years old

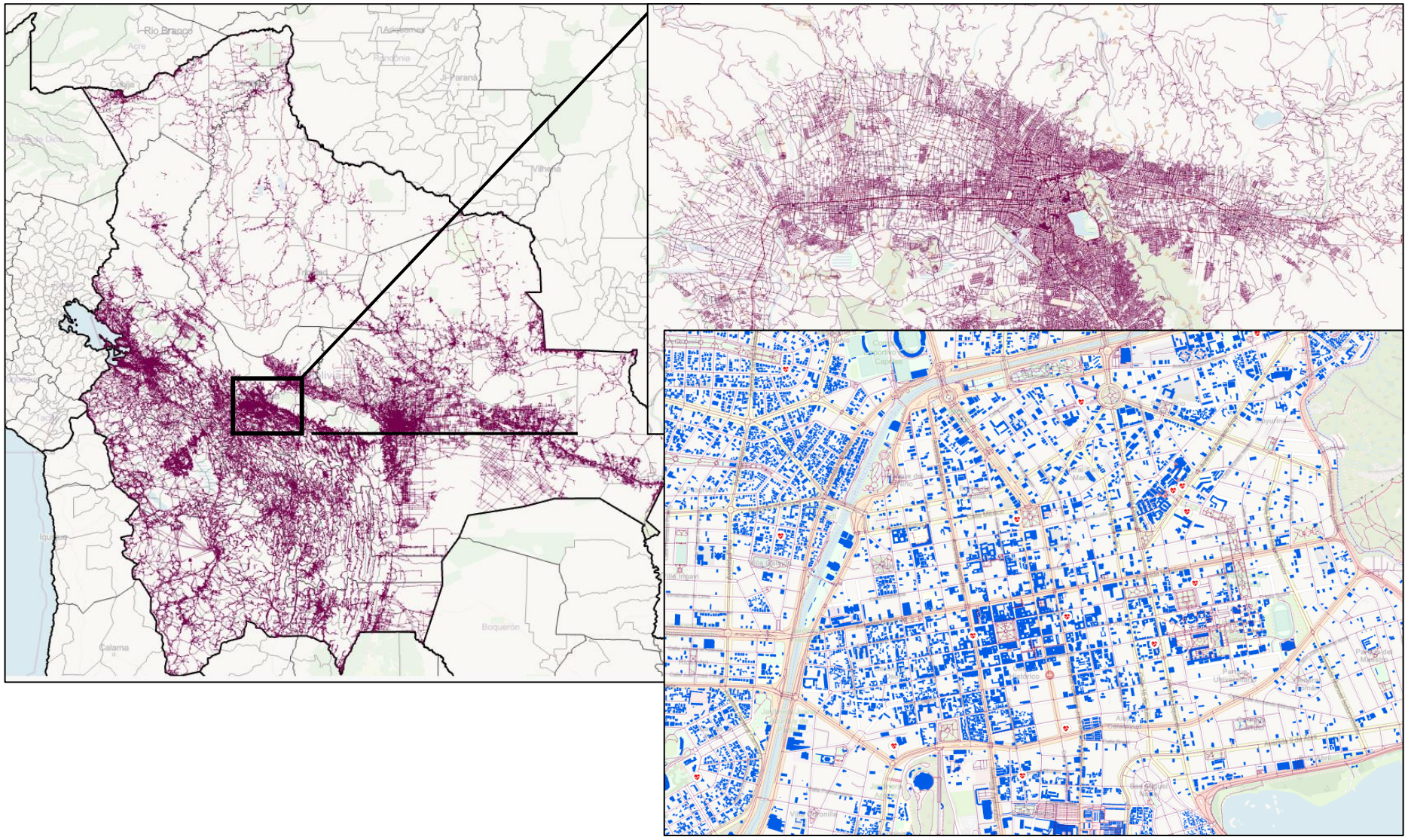


Map population density using census data for the entire population and the under-5 age group.

3. Mapping the road network

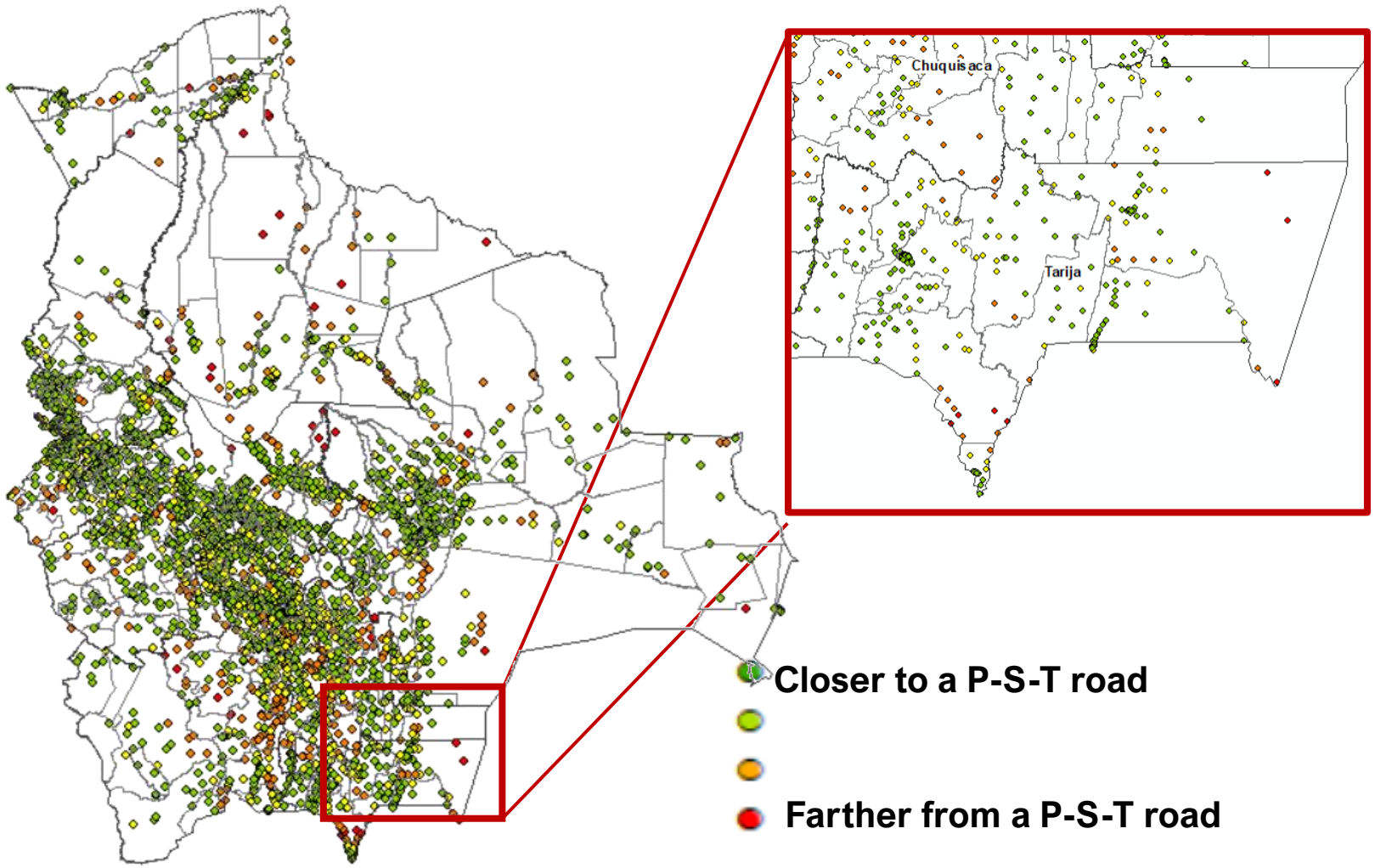
Use data from Bolivia's primary, secondary and tertiary road network.

Determine the distance between each building and the vaccination site.



4 - Determine the closest distance from a vaccination point to a primary, secondary and tertiary road.

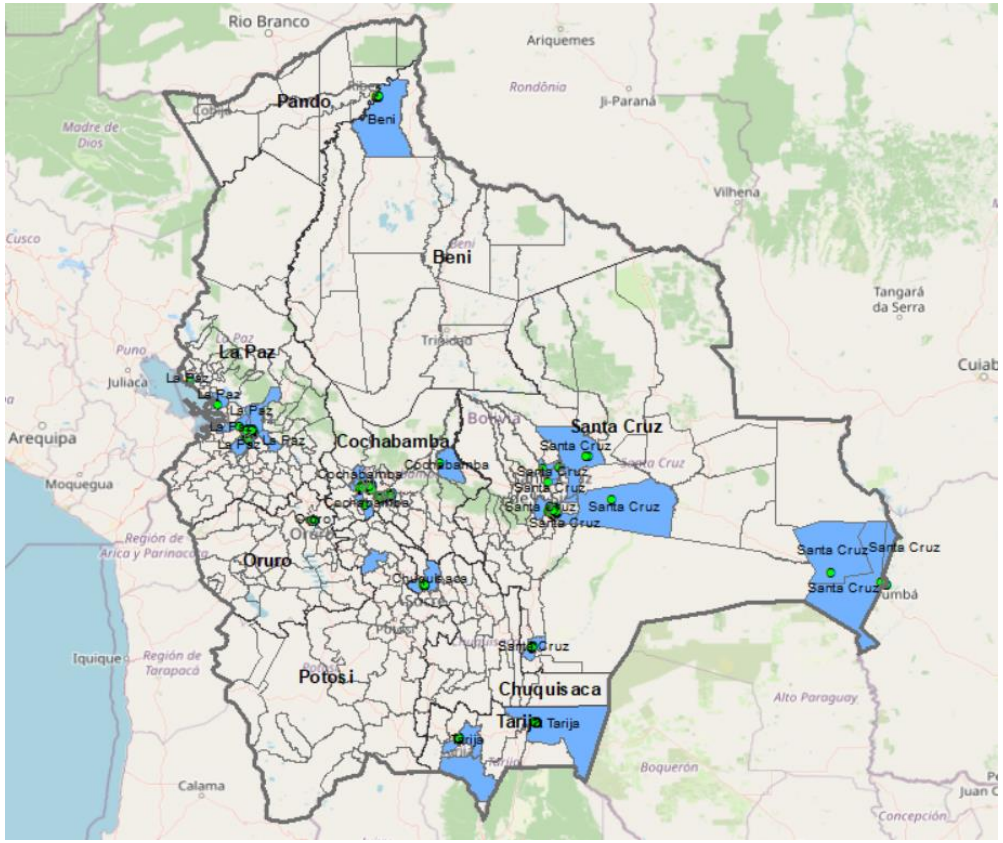
- Green dots indicate that it is closer to a P-S-T* pathway and red dots indicate that it is farther away.



Maps reflecting the proximity between vaccinator sites and roads

*Vía Primaria – Secundaria – Terciaria: P-S-T

5- Application of techniques to achieve the objective of locating specific areas for the microcensus, taking into account logistics:



Sitio Priorizado	ADM1_NATN	ADM2_ISO_N
1	Beni	Riberalta
2	Cochabamba	Cochabamba
3	Cochabamba	Arbieto
4	Cochabamba	Capinota
5	Cochabamba	Cliza
6	Cochabamba	Quillacollo
7	Cochabamba	Sipe Sipe
8	Cochabamba	Vinto
9	Cochabamba	Colcapirhua
10	Cochabamba	Puerto Villarroel
11	Cochabamba	Punata
12	Cochabamba	San Benito
13	Chuquisaca	Sucre
14	La Paz	La Paz
15	La Paz	Palca
16	La Paz	Achocalla
17	La Paz	El Alto
18	La Paz	Achacachi
19	La Paz	Escoma
20	La Paz	Viacha
21	La Paz	Pucarani
22	Oruro	Oruro
23	Potosi	Pocoata
24	Santa Cruz	Santa Cruz de La Sierra
25	Santa Cruz	Ayacucho
26	Santa Cruz	Pailon
27	Santa Cruz	Camiri
28	Santa Cruz	Montero
29	Santa Cruz	General Saavedra
30	Santa Cruz	Mineros
31	Santa Cruz	San Julian
32	Santa Cruz	Okinawa Uno
33	Santa Cruz	Puerto Suarez
34	Santa Cruz	Puerto Quijarro
35	Santa Cruz	Carmen Rivero Torrez
36	Tarija	Padcaya
37	Tarija	Tarija
38	Tarija	Villa Montes

- The selection is based on logistical considerations for the implementation of the microcensus.
- 38 municipalities selected, including 377 vaccination sites.

6- List the preliminary sections to evaluate the coverage indicators.

Sitio Priorizado	ADM1_NATN	ADM2_ISO_N
1	Beni	Riberalta
2	Cochabamba	Cochabamba
3	Cochabamba	Arbieto
4	Cochabamba	Capinota
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34	Santa Cruz	Puerto Quijarro
35	Santa Cruz	Carmen Rivero Torrez
36	Tarija	Padcaya
37	Tarija	Tarija
38	Tarija	Villa Montes

Selected municipalities

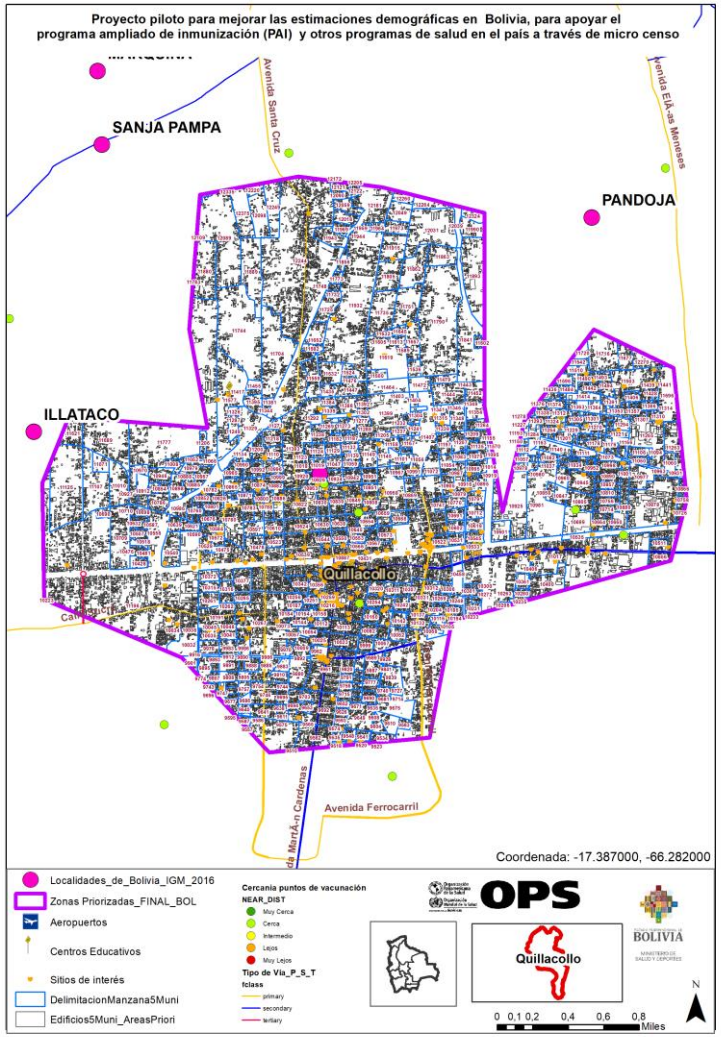
Departamen	Municipio	Localidad
La Paz	Achacachi	Achacachi
Potosi	Pocoata	Corojti
Tarija	Podcaya	Podcaya
Cochabamba	Quillacollo	Quillacollo
Santa Cruz	Santa Cruz DLS	Redes este y Centro

7- Verify selected municipalities and select building and/or houses to be visited for estimation of people in the field.

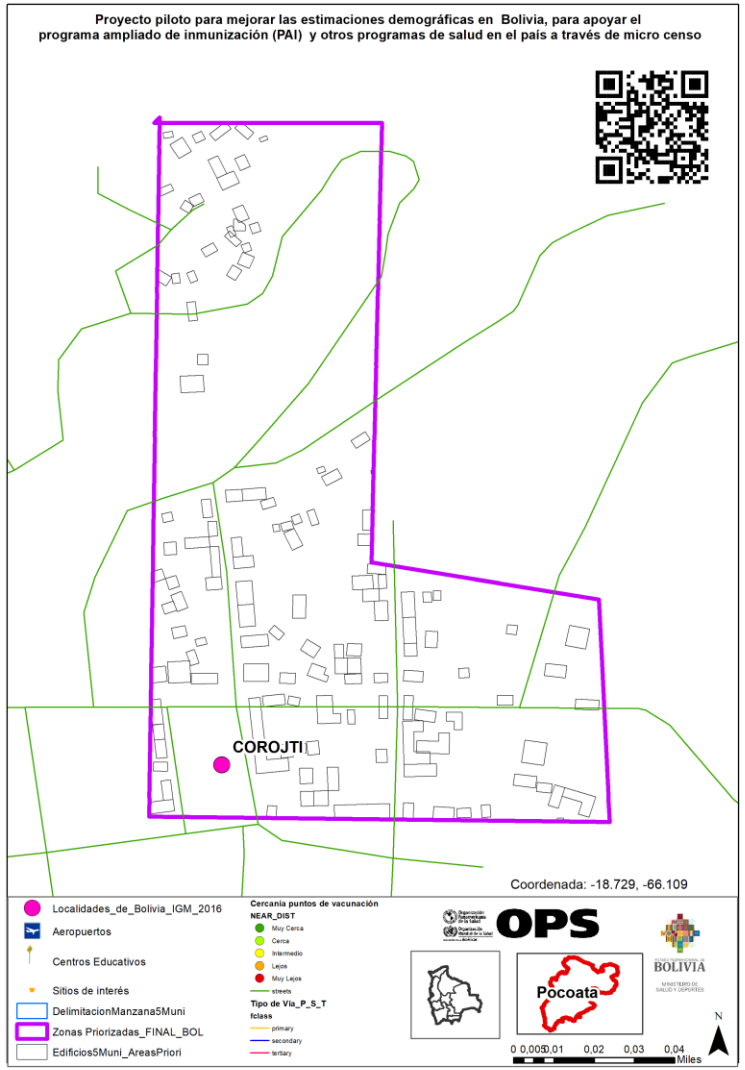
Nivel administrativo 1	Nivel administrativo 2	Número estimado de edificios a visitar	Totales de población estimados	Número estimado de cuadras a visitar	Número de equipos de campo/días de recolección de datos
Cochabamba	Quillacollo	787	1227	16	9 equipos de 3 personas / ~ 6 días en el campo
Potosí	Corojti	518	75	10	5 equipos de 3 personas / ~ 6 días en el campo
Tarija	Padcayá	50	25	1	2 equipos de 3 personas / ~ 3 días en el campo
Santa Cruz	Santa Cruz de la Sierra	2000	2662	40	17 equipos de 3 personas / ~ 7 días en el campo
La Paz	Achacachi	950	330	175	6 equipos de 3 personas / ~ 6 días en el campo

7- Verify selected municipalities and select building and/or houses to be visited for estimation of people in the field.

1

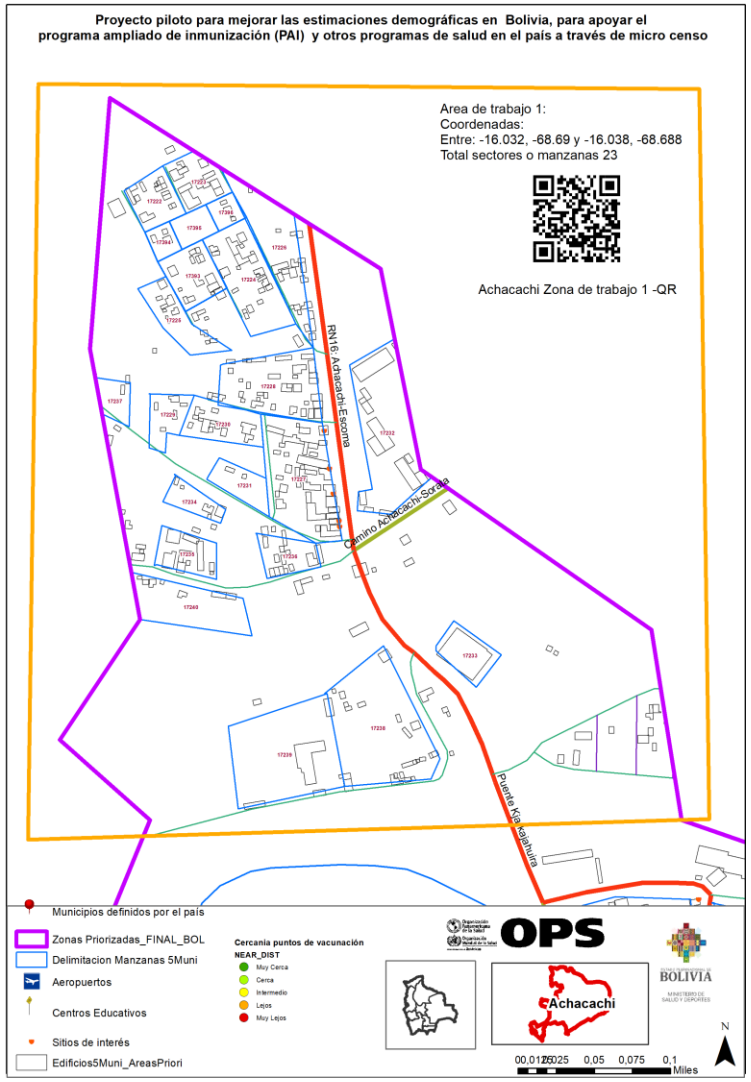


2



7- Verify selected municipalities and select building and/or houses to be visited for estimation of people in the field.

3



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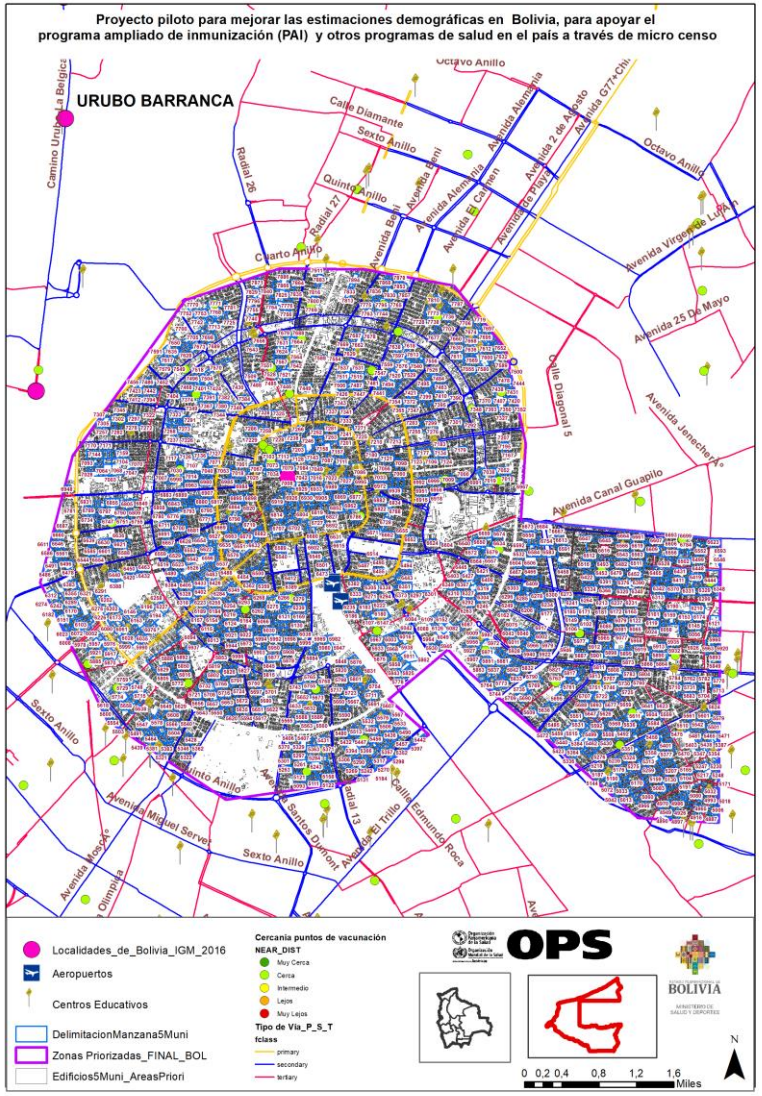
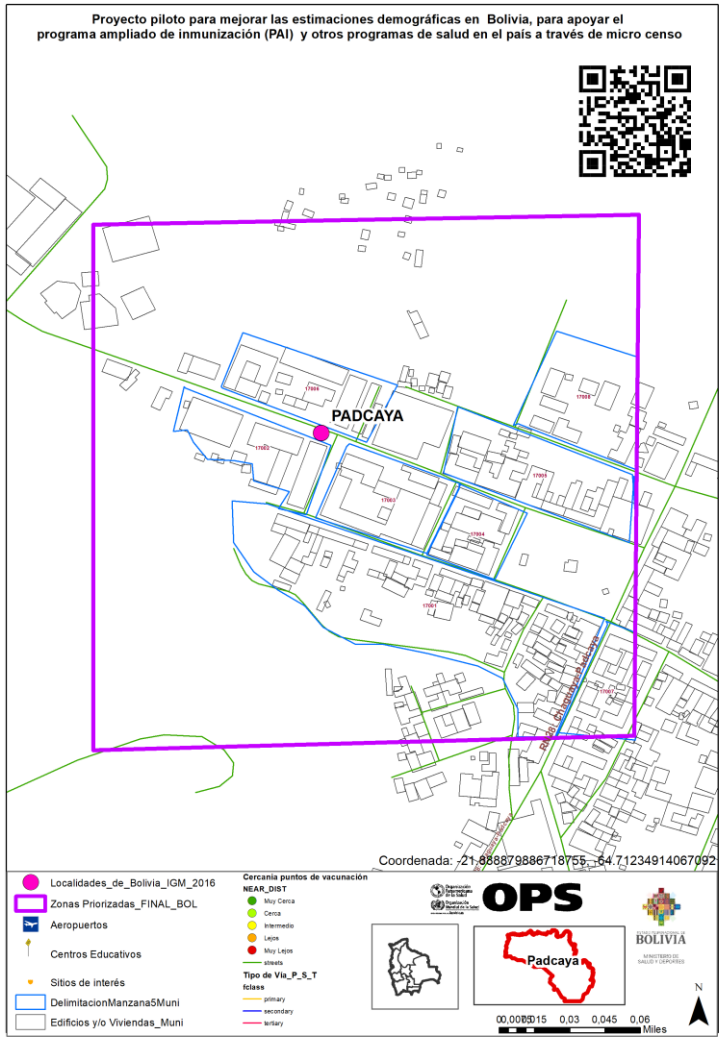
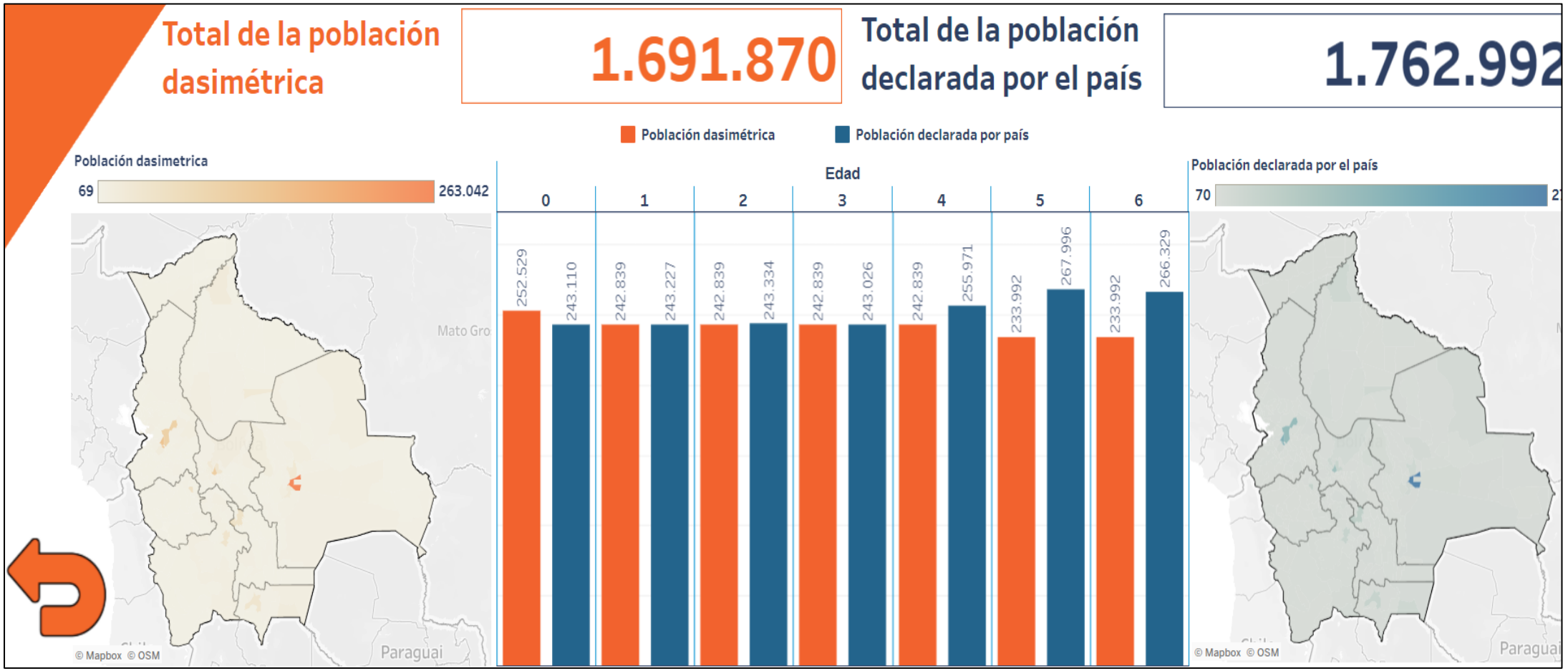


7- Verify selected municipalities and select building and/or houses to be visited for estimation of people in the field.

5



Population estimates for Bolivia



8. Implement the micro census

- A micro census will be implemented in 5 municipalities selected by the country.
- It will be a de facto enumeration.We have already obtained exemption from PAHO ERC. Bolivia does not have an ethics committee, so PAHO ERC recommended asking for permission from the Ministry of Health to move forward.
- We will hire a professional firm with experience in implementing political surveys and quality control of vaccination campaigns.
- Surveyors will visit each building to collect information about each person (i.e. name, gender, age, date of birth, relationship to head of household).
- The data will be collected on an Android tablet.
- Fieldwork is estimated to last one week in each municipality.
- The data will be retrieved every night and will be subject to exhaustive quality controls..

We want high-value information **for the entire region: correct, easy to access and current.**

Thank you!

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