Data Release Statement
GRID3 DRC Health Zone and Health Area Boundaries - Haut-Katanga, Kasaï, Kasaï-Oriental, Kinshasa, and Lomami Provinces, Version 01

June 2022

Abstract

This document outlines the methodology and data sources used for producing the GRID3 DRC Health Zone and Health Area Boundaries - Haut-Katanga, Kasaï, Kasaï-Oriental, Kinshasa, and Lomami Provinces Version 01 dataset. The dataset consists of health catchment area boundaries with names in the aforementioned provinces in the Democratic Republic of the Congo (DRC). Limitations and use constraints are also provided.

Dataset citation


Data Use Constraints

Users are free to use, copy, distribute, transmit, and adapt the work for commercial and non-commercial purposes, without restriction, as long as clear attribution of the source is provided.

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Contacts and Data Queries

GRID3 appreciates feedback regarding this dataset, including suggestions, discovery of errors, difficulties in using the data, and format preferences.

Please contact: Geo-Referenced Infrastructure and Demographic Data for Development (GRID3), data.queries@grid3.org
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I. Introduction

The GRID3 DRC Health Zone and Health Area Boundaries - Haut-Katanga, Kasai, Kasai-Oriental, Kinshasa, and Lomami Provinces, Version 01 dataset consists of health area boundary polygons with names and attributes in the provinces of Haut-Katanga, Kasai, Kasai-Oriental, Kinshasa, and Lomami in the Democratic Republic of the Congo (DRC). This dataset is one of five (5) datasets (along with the Settlements, Health Facilities, Schools, and Religious Centres datasets) included in this Version 01 release.

To conduct this work, the Center for International Earth Science Information Network (CIESIN) at Columbia University engaged with the mandated authorities in the DRC’s Ministry of Health who support data collection and development for vaccination planning. Local healthcare workers were also directly involved in the mapping of the health catchment area boundaries at participatory events coordinated with in-country provincial coordinators and mappers, and in the collection of data in the field from January to July 2021.

This work is part of the GRID3 Mapping for Health in the DRC project. Supported by Gavi through its INFUSE initiative, GRID3 Mapping for Health is a Ministry of Health initiative delivered in partnership with Flowminder and CIESIN (Columbia University), in collaboration with WorldPop at the University of Southampton, the Kinshasa School of Public Health, UNFPA, UNOPS, and Novel-T. GRID3 Mapping for Health is a continuation of previous work conducted and/or supported in the DRC by the Geo-Referenced Infrastructure and Demographic Data for Development (GRID3) programme.

II. Methodological Approach

The methodological approach described below is accurate for the provinces of Haut-Katanga, Kasai, Kasai-Oriental, Kinshasa, and Lomami.

Summary

With the support of provincial and national health authorities, local healthcare workers (“head nurses,” “health zone management staff,” and “head doctors of the health zones”) and GRID3 GIS specialists (“mappers” and “provincial coordinators”) engaged in a participatory mapping process in Haut-Katanga, Kasai, Kasai-Oriental, Kinshasa, and Lomami from January to July 2021. This mapping process occurred at the level of the health zone (an operational unit made up of approximately 15-20 health areas).
Mappers were deployed to health zones in teams of two for approximately nine (9) days. They started their work in the health zone by training the head nurses of each health area on data collection using the Geospatial Tracking System (GTS), an Open Data Kit (ODK)-based smartphone application. The GTS application, developed by Novel-T, is an Android mobile application that collects data in the field and a cloud-based central server with a dashboard to manage activities, display data on maps, and permit downloading of datasets for further analysis. While the head nurses were collecting data in the health areas they regularly work in, the mappers worked with the health zone management team to validate and modify data from the field. After all data were collected, cleaned, and integrated into final geospatial layers, the first round of validation was conducted on preliminary data by the head doctor of the health zone before the mappers left the health zone.

From July 2021 through October 2022, the DRC mappers and provincial coordinators worked with CIESIN staff to consolidate the data (including spelling, gaps and overlaps, topology). The data were then used to produce basemaps at the health area level and shared back with every health zone and province for the second round of validation. From November through January 2022, the DRC GIS team worked with CIESIN staff to integrate these corrections into a final geodatabase.

This work was done with the participation and supervision of the Direction du Système National d'Information Sanitaire (DSNIS). The Agence Nationale d'Ingénierie Clinique, de l'Information et de l'Informatique de Santé (ANICiiS) also played an important role regarding data governance.

Details

Phase 1: Field data collection

A head nurse is responsible for much of the management of their assigned health area. These professionals work routinely in their respective areas and are familiar with a given area's health facilities, settlements, and points of interest (POIs). Accordingly, mappers trained the head nurses to collect data on these characteristics using the GTS application. These nurses also learned how to use the application to manage activities, display data through web-based maps, download datasets for further analysis, and record time-stamped GPS coordinates (tracks) of health area teams in the field at regular intervals for accountability and tracking purposes.

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1 The duration of the fieldwork was adjusted based on the size and accessibility of the health zones. In some smaller, urban areas, the data collection could be slightly reduced, while the fieldwork in hard-to-reach health areas was extended up to 15 days to maximise accuracy.
After the training, these head nurses were deployed to their health areas for three to four days of data collection. The GRID3 mappers worked with the health zone management team to familiarise themselves with GIS software and begin a participatory mapping process. This process included reviewing satellite images to help orient the GRID3 mappers and health zone management team.

In rural areas, the mappers (with the support of the health teams) used all the POI locations (settlements, health facilities, religious centres, schools), natural and human-made features (rivers, lakes, roads, railways, etc.), and high-resolution satellite images to delineate the boundaries out of the point datas.

In urban areas that required a higher level of precision to be relevant (up to the street level), the head nurse used Geotrace² to walk the perimeter and precisely delineate the health areas. The output was a polygon layer that would be cleaned and then checked with the health teams.

Limits of urban health areas in Kinshasa. The dash line (“geotrace”) represents the limits tracked by the head nurse while walking the perimeter of the health area using the Geotrace application.

²An application available in the GTS that collects GPS points at regular intervals (every 10 metres for this exercise).
Once the rural and urban health areas were compiled, mappers worked with the health zone management staff to ensure that the boundaries properly encompassed all of the points that they were supposed to encompass. They also edited the boundary files to address gaps and overlaps. The mappers worked to refine the health catchment boundary layer (alongside layers related to settlements, health facilities, and other POIs) for the remainder of their nine-day stay in a given health zone. They then presented all of the layers to the head doctor of the health zone.

Phase 2: Cleaning and consolidation

Once data were collected in all of the health zones in a province, mappers worked with provincial coordinators to consolidate a provincial health catchment area layer with health zone and health area boundaries clearly delineated. These data were sent back to GIS specialists at CIESIN for review, province by province, between March 2021 and July 2021.

CIESIN then checked the files for gaps and overlaps and corrected all topological errors in the file. They additionally ensured that all relevant point data were properly encompassed by their corresponding boundaries.

In August 2021, CIESIN returned the data to mappers working from the GRID3 office in Kinshasa. These mappers worked on adding missing information and correcting any identified errors by communicating directly with health zone management staff over the phone and checking original field data. If point data were moved or the attribute for health area or health zone was changed, this also required a change in the boundaries.

The edited health boundary layers were sent back to GIS specialists at CIESIN, province by province. Again, CIESIN reviewed the layers and ensured that there were no gaps and overlaps in the boundary files. CIESIN created an alpha health catchment boundary layer and created initial basemaps for all health zones and health areas in combination with their corresponding settlement, health facility, and POI layers.

These health area basemaps were sent to the Medecin Chef d'Antenne (MCA), EPI data managers, and head doctors of health zones in October 2021 for the second round of validation. The head doctor of the health zone organised their team to check that the boundaries were correctly delineated and that all of the appropriate points that fell within their jurisdiction were present. Once all of the changes had been integrated, mappers sent the provincial data back to CIESIN for review. CIESIN did one last review of the health catchment area layer by ensuring that the final set of boundaries did not have any gaps or overlaps.

Finally, CIESIN shared the health zone and health area layers with the Technical Committee, under the leadership of the DSNIS, to get some additional feedback from
the central level. Some adjustments were made to align some of the health boundaries of the national boundaries, notably in the south of Kasaï Province (Kitangua health zone). All the geodata processing steps were done using ArcGIS Pro 10.7.

III. Dataset Description(s)

GRID3 DRC Health Catchment Area Boundaries - Haut-Katanga, Kasaï, Kasaï-Oriental, Kinshasa, and Lomami Provinces Version 01 dataset consists of one layer: health catchment area polygon data and a table with the field descriptions for the layers. The data are available for download in Esri file geodatabase format packaged in zip files.

**Filename:** GRID3_DRC_health_catchment_area_boundaries_V01.gdb

The following layers are included in the gdb:

GRID3_DRC_health_catchment_zone_boundaries_5_prov_V01

GRID3_DRC_health_catchment_area_boundaries_5_prov_V01

**Extent:** Democratic Republic of the Congo: Haut-Katanga, Kasaï, Kasaï-Oriental, Kinshasa, and Lomami provinces.

**DRC provincial extents:**

*Haut Katanga Extent*
West 25.413033 East 29.810980
North -7.611716 South -13.455997

*Kasaï Extent*
West 19.676606 East 22.317255
North -2.309603 South -7.286028

*Kasaï-Oriental Extent*
West 22.944402 East 24.061856
North -5.667474 South -6.773613

*Kinshasa Extent*
West 15.161557 East 16.538300
North -3.927611 South -5.050161

*Lomami Extent*
West 23.009694 East 26.280757
North -4.865162 South -8.091451

**Coordinate system:** GCS WGS 1984
Health Area Boundaries

Some boundaries from Haut-Katanga are known to fall outside of the provincial boundary, in the neighbouring Lualaba Province. They belong to the police and military health zones of Kowe and Vangu.
The maps above shows health area and health zone boundaries collected in Kinshasa, Kasai, Kasai-Oriental, Lomami, and Haut Katanga provinces. Some boundaries from Haut-Katanga are known to fall outside of the provincial boundary, in the neighbouring Lualaba Province. They belong to the police and military health zones of Kowe and Vangu.
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IV. Known Data Limitations

The spatial accuracy of the health catchment area data is dependent on both the accuracy of the point data collected in the field as well as on the correctness of the edits made to the baseline layer throughout the validation process. In general, it was assumed that the field collected data were more accurate than the previously compiled health area polygon data.

Known issues

- Spelling mistakes (spelling may vary colloquially and between organisations; the most authoritative sources were given priority)
- The Police Zone and Kokolo health zones in Kinshasa, as well as the Kowe and Vangu health zones in Haut-Katanga, are health zones that are spread out in multiple small areas made of military and police camps in urban areas. They were included as multi-part polygons.
- There were sometimes discrepancies between the number of health areas present in the DHIS2 (at the central level) and the number of officially recognised and used health areas in the field (at the provincial level). The GRID3 mappers worked closely with the Médecins Chefs de Zones and Infosan to reflect, as well as possible, the reality in the provinces.
- In Haut-Katanga, some health areas fall outside the provincial boundaries, in the neighbouring province of Lualaba. They are part of special police and military health zones (Kowe and Vangu health zones).

V. Disclaimer

The health areas and health zones boundaries are purely based on the data collected in the field by the head nurses of each health area and the feedback provided by the health team staff in their respective provinces. These health area and health zone boundaries are not intended to replace any existing/official administrative boundaries endorsed by the government.

CIESIN, Columbia University, and the GRID3 programme follow procedures designed to ensure that data disseminated by the project are of reasonable quality. If, despite these procedures, users encounter apparent errors or misstatements in the data, they should contact GRID3 at data.queries@grid3.org.

CIESIN, Columbia University, and their sponsors do not guarantee the accuracy, reliability, or completeness of any data provided. We provide this data without warranty of any kind whatsoever, either expressed or implied, and shall not be liable for incidental, consequential, or special damages arising out of the use of any data provided.
VI. Acknowledgments

GRID3 thanks the following institutions that provided input data and/or assistance with data production:

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Bureau Central du Recensement (BCR), DRC
Centers for Disease Control and Prevention (CDC), USA
Direction d’Etudes et Planification (DEP), DRC
Direction des Soins de Santé Primaires (DSSP), DRC
Division du Système National d’Informations Sanitaires (DSNIS), DRC
Division Provinciale de la Santé (DPS) du Haut-Katanga, Kasaï, Kasaï-Oriental, Kinshasa, and Lomami, DRC
Ecole de Santé Publique de Kinshasa (ESPK), DRC
Gavi, the Vaccine Alliance, Switzerland
Geospatial Evaluation and Observation Lab (geoLab), College of William & Mary, USA
Global Affairs Canada (GAC), Canada
The International Medical Corps (IMC) Développement (IDRAC Sarl), DRC
International Federation of Red Cross and Red Crescent Societies (IFRC), Switzerland
Médecins Sans Frontières (MSF), Switzerland
Ministère de l’Environnement et Développement Durable (MEDD), DRC
Ministère de la Santé publique, Hygiène et Prévention, DRC
Ministère du Genre, Famille et Enfant, DRC
Novel-T, Switzerland
Open Street Map (OSM), DRC
PATH, DRC
Programme Elargi de Vaccination (PEV), DRC
Programme National de Lutte contre le Paludisme (PNLP), DRC
Référentiel Géographique Commun (RGC), DRC
SANRU, DRC
Caritas, the International Medical Corps (IMC), USA
The International Organization for Migration (IOM), DRC
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United Nations Children Fund (UNICEF), USA
United Nations Development Programme (UNDP), USA
United Nations Office for Project Services (UNOPS), Denmark
United Nations Office for the Coordination of Humanitarian Affairs (OCHA), USA
United Nations Organization Stabilization Mission in the Democratic Republic of the Congo (MONUCSO), DRC
University of California, Los Angeles (UCLA) DRC Health Research and Training Program, USA
VillageReach, DRC
World Health Organization (WHO), Switzerland
World Resources Institute (WRI), USA

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