Data Release Notes

Name of the dataset	GRID3 COD - Health Facilities v1.0
Name of the file	*GRID3_COD_health_facilities_v1.0.gpkg*
Date of data release	2024-05-10
File format	OGC Geopackage
Dataset version	1.0
Abstract	This document outlines the methodology and data sources used during the production of the GRID3 COD - Health Facilities v1.0 dataset. The dataset consists of health facility points with name, location, health zone, and health area, among other attributes, for ten provinces in the Democratic Republic of the Congo (COD). Limitations and use constraints are provided. This operational dataset has not been fully validated by government officials or ministries.
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Contacts and data queries	The authors of this dataset appreciate feedback regarding the data, including suggestions, discovery of errors, difficulties in using the data, and format preferences. For dataset-related questions, please send an email to: info@ciesin.columbia.edu

I.   **Input datasets**

To create this dataset, CIESIN developed a consistent data schema and methodology to harmonize the data from ten different provinces collected as three different province groups. The province groups are legacy groupings corresponding to the order in which the original data was collected.

Province group 1: Haut-Katanga, Kasaï, Kasaï-Oriental, Kinshasa, and Lomami
Province group 2: Haut-Lomami and Tanganyika
Province group 3: Ituri and Kwilu
Province group 4: Maniema

The input data includes data from all four province groups. The collection process for each of these groups is detailed below by province group.

Province Group 1: Haut-Katanga, Kasaï, Kasaï-Oriental, Kinshasa, and Lomami

From January to July 2021 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, Kasaï, Kasaï-Oriental, Kinshasa, and Lomami. 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 days where they trained the health area head nurses on data collection using the Geospatial Tracking System (GTS), an Open Data Kit (ODK)-based smartphone application[1]. The head nurses routinely work in their respective areas and have a good understanding of the health facilities, settlements, and points of interest (POIs, such as schools and religious centers) present.

While the head nurses collected data in their health areas, 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 health zone head doctor validated the preliminary data.
From July 2021 through October 2022, the mappers and provincial coordinators worked with CIESIN staff to consolidate the data (spelling, gaps and overlaps, topology, etc). This data was 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 in-country 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 in the area of data governance.

Province Group 2: Haut-Lomami and Tanganyika

From July to September 2019 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-Lomami and Tanganyika. 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 the health zones, where they organized participatory mapping meetings with local healthcare workers. They also trained head nurses to collect data on settlements, health facilities, and other points of interest in their respective health areas using an ODK-based smartphone application. Mappers then used this information to delineate health area boundaries. This data was then sent back to CIESIN for additional quality checks.

The data collected in the field proved to be highly accurate and nearly complete when compared to the master list of health facilities managed by the Health Information Systems unit (DSNIS) within the Ministry of Health. To ensure 100% completion, CIESIN supplemented the collected data with data from Acasus, PROSANI, and the WHO. All data collected in the field were retained.

Province Group 3: Ituri and Kwilu

Ituri and Kwilu health facility point data from different sources listed in the table below was combined and then verified through field missions and comparisons with the DHIS2 database.

Table 1: Data Sources

Source Acronym	Source Name	Kwilu	Ituri
EPI_ACASUS	Programme Elargi de Vaccination (PEV) / Acasus	X	X
BLSQ	Bluesquare	X	
DSNIS	Division du Système National d'Information Sanitaire (DSNIS)	X	X
MoH_CIESIN	Ministère de la Santé Publique (MoH) / Center for International Earth Science Information Network (CIESIN)	X	X
KSPH_ECV	Ecole de Santé Publique de Kinshasa (KSPH) / Enquête de couverture vaccinale (ECV)		X
WHO_DSNIS	Organisation Mondiale de la Santé (WHO) / Division du Système National d'Information Sanitaire (DSNIS)		X
PNLP_IMA	Programme National de Lutte contre le Paludisme (PNLP) / IMA World Health	X	
PNLTHA_UCLA	Programme National de Lutte contre la Trypanosomiase Humaine Africaine (PNLTHA) / Programme de recherche et de formation en santé (UCLA)	X	

Source Acronym	Source Name	Kwilu	Ituri
WHO_ISS	Organisation Mondiale de la Santé (WHO) / Supervision Formative Intégrée (ISS)	X	

In Kwilu, the data collection was completed by a wide range of actors

- PNPL_IMA World Health: data collected by IMA World Health on the behalf of the PNLP (National Program for the Fight Against Malaria) as part of the ITN (Insecticide-Treated mosquito Nets) distribution campaign, between June and August 2022. Enumerators from local health zone teams (Infirmiers Titulaires, Relais Communautaires, Fieldwork supervisors, etc) collected GPS points of the health facilities in their distribution areas.

- EPI_Acasus: time series data from the multiple rounds of EPI supervisions of fixed vaccination sessions at the health facility level since 2020. The data is collected by EPI staff.

- DSNIS: primary data collected by head nurses (Infirmiers Superviseurs) trained by the Bureau de Cartographie, using Garmin GPS devices. The data was collected by Infirmier Superviseurs.

- WHO_ISS: data collected by WHO consultants since 2019 as part of the Integrated Supportive Supervision (ISS) visits on the performance of health workers.

- PNLTHA_UCLA: data collected by a team of enumerators in the field by UCLA on the behalf of the National Sleeping Sickness Control Programme in 2018.

- Bluesquare: compilation of data collected in the field by various partners.

- MoH_CIESIN: mix of data directly collected in the field or digitalized under the close supervision of the health team (in order to complete some data gaps when funds were not available to collect the data in the field).

A first GRID3 verification mission was carried out in October-November 2021. Two GRID3 mappers traveled to Kikwit and Bandudu, respectively, to present the consolidated data in digital and printed format. The majority of the verifications were carried out in collaboration with antenna-level and provincial-level staff. Some targeted additional data collection was done to fill in some gaps. A second GRID3 mission was organized one year later, in October-November 2022, after a significantly improved version was produced by CIESIN using recent data outputs of the ITN distribution campaign. A second round of data validation took place in the Kikwit and Bandudu antenna to update and consolidate the existing data.

In Ituri, the data collection was completed by the following actors:

- MoH_CIESIN: mix of data directly collected in the field or digitalized under the close supervision of the health team (in order to complete some data gaps when funds were not available to collect the data in the field).

- WHO_DSNIS: data set compiled by the WHO GIS team in support of the National Health Information System Division (DSNIS) together with the OpenStreetMap community and various partners after the Ebola outbreak in August 2018. The data can be downloaded from HDx here: https://data.humdata.org/dataset/drc-health-facilities.

- EPI_Acasus: time series data from the multiple rounds of EPI supervisions of fixed vaccination sessions at the health facility level since 2020. The data is collected by EPI staff.

- DSNIS: primary data collected by head nurses (Infirmiers Superviseurs) trained by the Bureau de Cartographie, using Garmin GPS devices. The data was collected by Infirmier Superviseurs.

- KSPH_ECV: data collected by Kinshasa School of Public Health (KSPH) in 2020 and 2021 as part of the Vaccination Coverage Survey.

The data was verified through a mission organized in October 2022. Four GRID3 mappers traveled to Bunia and Aru, respectively, to validate the health data in all health zones of the two antennas. During this mission, the GRID3 mappers arranged for the transportation of local health teams to the antenna, where they validated the preliminary layers and suggested improvements where they were needed. They ensured that the health facility data was complete and without orthographic errors.

All modifications from both missions were sent back to CIESIN for final verification before publication. CIESIN ensured that the final layers were free of spelling and that each health area had at least one health facility.

Province Group 4: Maniema

Table 2. Data Sources

Name	Data type/ format	Release year	Input data year	Source Acronym
Fieldwork data collected by the Kinshasa School of Public Health in the Democratic Republic of the Congo (KSPH, DRC)	Spatial points	2024	2024	KSPH_GRID3
Pre-Distribution Registration Survey (PDRS) from the National Malaria Control Programme (PNLP) collected as part of the anti-malaria campaigns in the Democratic Republic of the Congo	Spatial points	2022	2022	PEV_CDC_CIESIN
Programme Elargi de Vaccination (PEV) / Acasus	Spatial points	2023	2019-2023	PEV_ACASUS

The Maniema data was created through an extensive fieldwork data collection conducted by the Kinshasa School of Public Health (Ecole de Santé Publique de Kinshasa, ESPK) spanning from October 2023 to

January 2024, and supplemented with additional data from the Pre-Distribution Registration Survey (PDRS) from the National Malaria Control Programme (PNLP) collected as part of the anti-malaria campaigns in 2022, as well as data from the Elongated Programme for Immunization (EPI/PEV) collected by Acasus between 2019 and 202 in the Democratic Republic of the Congo.

Phase 1: Integration of data from the PNLP

In 2022-2023, CIESIN received geolocated health facilities from the data sources specified above. These datasets were assembled and explored, cleaned, and matched against existing microplans from Maniema, from prior years. The combined data sets created the list of health facilities to collect during fieldwork.

Phase 2: 2023-2024 Field data collection

The Kinshasa School of Public Health (ESPK), with the support of provincial and national health authorities, local healthcare workers (i.e. head nurses, health zone management staff, and head doctors of the health zones) and GRID3 GIS specialists engaged in data collection from October 2023 to January 2024. Teams of enumerators were deployed to each health zone, and liaised with local authorities and local health workers to collect health facility's names and geographic points using an ODK-based smartphone application. This data was then sent back to CIESIN for processing, integration, and quality checks.

II.   Methodology

Data processing, integration, and harmonization scripts have been developed and updated by CIESIN as new data becomes available. A data schema prioritizing information preservation was developed to include fields common to all or most of the datasets in all four province groups. Common generalized values were created for all fields and the original values in each dataset were mapped to these.

The data schema enabled the consolidation of data from two previously published health facility datasets in province groups 1 & 2 (Haut-Katanga, Haut-Lomami, Kasaï, Kasaï-Oriental, Kinshasa, Lomami and Tanganyika) and the unpublished data from province groups 3 & 4 covering health facilities in the provinces of Ituri, Kwilu and Maniema.

III.   Dataset Description

The *GRID3 COD - Health Facilities v1.0* dataset consists of health facility spatial point data. The data are available for download in OGC Geopackage format contained in a zip file.

This data release supersedes the following datasets:
- *GRID3 COD - Health Facilities: two provinces v1.0*
- *GRID3 COD - Health Facilities : six provinces v1.0*
- *GRID3 COD - Health Facilities BCZ : six provinces v1.0*
- GRID3 COD - Health Facilities Secondary: six provinces v1.0

The codebook for health facilities is shown below.

Table 3: Codebook for Health Facilities

Variable Names	Values example	Type	Definition
OBJECTID	1	numeric	Software- generated unique code
pays	République démocratique du Congo	text	Country name french official UN member state spelling
iso3	COD	text	ISO3 code
province	Lomami	text	DHIS2 province name
prov_uid	F9w3VW1cQmb	text	The identifier of the province in the DHIS2
zonestante	Kabinda	text	DHIS2 health zone name
zs_uid	NR5cDy2jhiJ	text	The identifier of the health zone in the DHIS2
airesante	Kemayi	text	Health area name
as_uid	BuOpOXDJJpy	text	The identifier of the health area in the DHIS2
localite	Mutengu	text	Settlement name
essnom1	PS Bon Berger	text	Abbreviated version of the health facility type (fosatype) and health facility name (fosanom2)
esstype	Poste de Santé	text	Health facility type generalized by GRID3 from original raw data
essnom2	Bon Berger	text	Health facility name without type
source	GRID3	text	Institution or project providing point data for this dataset
typeorig	Post de Santé	text	Health facility type from original raw data
origine	GPS	text	Method of coordinate derivation
date	2022	text	Year of data collection or last edit/modification
dhis2	E1jmD0BiZ5s	text	DHIS2 health facility code
categorie	Privé	text	Category of health facility
frigo	Non	text	Refrigeration available
frigofct		text	Refrigeration functioning at time of field work
vaccfixe	Non	text	Is this site a fixed vaccination site
lat	-6.216226668	numeric	Latitude in decimal degrees
lon	24.017475	numeric	Longitude in decimal degrees
precision	7.6	numeric	Precision of GPS coordinates indicating the tolerance in meters
grid3id	hf_F6FD8B8CFD	text	Internal GRID3 ID

IV. Known Data Limitations and Disclaimer

The spatial accuracy of the health facility 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 collected data throughout the validation process. In general, it was assumed that the field collected data were more accurate than the previously compiled health facility point data. Temporal mismatches exist among the point datasets and the satellite imagery used to perform quality checks. This may lead to health facilities not being identified or the inclusion of abandoned health facilities. Likewise, spelling mistakes and/or mismatches may have occurred due to colloquial variations on how data points are referred to in the field.

The scope of the GRID3 Mapping For Health project included fieldwork and validation for Haut-Katanga, Kasaï, Kasaï-Oriental, Kinshasa, and Lomami provinces and 115 health zones.

This operational dataset has not been fully validated by government officials or ministries.

CIESIN, Columbia University, and its co-authors 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 CIESIN, info@ciesin.columbia.edu.

CIESIN, Columbia University, its co-authors, and their sponsors do not guarantee the accuracy, reliability, or completeness of any data provided. We provide these 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.

V. Acknowledgments

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Caritas, USA
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) de Kinshasa, Kwilu, Kasaï, Kasaï-Oriental, Lomami, Haut-Lomami, Tanganyika, Haut-Katanga, and Ituri
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
Global Good, USA

IMA World Health, DRC
Initiative Régionale de Documentation et d'Accompagnement Communautaire au
Développement (IDRAC Sarl), DRC
International Federation of Red Cross and Red Crescent Societies (IFRC), Switzerland
International Medical Corps (IMC), USA
Médecins Sans Frontières (MSF), Switzerland
Ministère de l'Environnement et Développement Durable (MEDD), DRC
Ministère de la Santé publique, Hygiène et Prévention, DRC
Novel-T, Switzerland
Open Street Map (OSM), DRC
PATH, USA
Programme Elargi de Vaccination (PEV), DRC
Programme National de Lutte contre le Paludisme (PNLP), DRC
Référentiel Géographique Commun (RGC), DRC
Soins de Santé Primaires en Milieu Rural (SANRU), DRC
The International Organization for Migration (IOM), DRC
United Nations Children Fund (UNICEF), USA
United Nations Development Programme (UNDP), USA
United Nations Office for Project Services (UNOPS), Denmark and DRC CO
United Nations Office for the Coordination of Humanitarian Affairs (OCHA), USA
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