Release Statement

Grid level (5x5km) prediction and uncertainty surfaces for selected reproductive, maternal, newborn, child, and adolescent health and development indicators for 2014 (DHS-7) and 2022 (DHS-8) Kenya and their change over time, version 1.0

25/11/24

Release Content and Descriptions

ANC_4plus_round1.tif ANC_4plus_round1_sd.tif ANC_4plus_round1_lower.tif ANC_4plus_round1_median.tif ANC_4plus_round1_upper.tif ANC_4plus_round2.tif ANC_4plus_round2_sd.tif ANC_4plus_round2_lower.tif ANC_4plus_round2_median.tif ANC_4plus_round2_upper.tif ANC_4plus_change.tif ANC_4plus_change_sd.tif ANC_4plus_change_lower.tif ANC_4plus_change_median.tif ANC_4plus_change_upper.tif	The proportion of women with a live birth in the five years preceding the survey and who had four or more antenatal care visits. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
ANC_blood_round1.tif ANC_blood_round1_sd.tif ANC_blood_round1_lower.tif ANC_blood_round1_median.tif ANC_blood_round1_upper.tif ANC_blood_round2.tif ANC_blood_round2_sd.tif ANC_blood_round2_lower.tif ANC_blood_round2_median.tif	The proportion of women with a live birth in the five years preceding the survey who received antenatal care for the most recent birth with blood sample taken. The grid level estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change).

ANC_blood_round2_upper.tif ANC_blood_change.tif ANC_blood_change_sd.tif ANC_blood_change_lower.tif ANC_blood_change_median.tif ANC_blood_change_upper.tif	
ANC_suppl_round1.tif ANC_suppl_round1_sd.tif ANC_suppl_round1_lower.tif ANC_suppl_round1_median.tif ANC_suppl_round1_upper.tif ANC_suppl_round2.tif ANC_suppl_round2_sd.tif ANC_suppl_round2_lower.tif ANC_suppl_round2_median.tif ANC_suppl_round2_upper.tif ANC_suppl_change.tif ANC_suppl_change_sd.tif ANC_suppl_change_lower.tif ANC_suppl_change_median.tif ANC_suppl_change_upper.tif	The proportion of women with a live birth in the five years preceding the survey who received iron tablets or syrup during antenatal care. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
ANC_timing_round1.tif ANC_timing_round1_sd.tif ANC_timing_round1_lower.tif ANC_timing_round1_median.tif ANC_timing_round1_upper.tif ANC_timing_round2.tif ANC_timing_round2_sd.tif ANC_timing_round2_lower.tif ANC_timing_round2_median.tif ANC_timing_round2_upper.tif ANC_timing_change.tif ANC_timing_change_sd.tif ANC_timing_change_lower.tif ANC_timing_change_median.tif ANC_timing_change_upper.tif	The proportion of women who had a live birth in the five years preceding the survey whose first antenatal care visit was at less than 4 months. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.

ANC_urine_round1.tif ANC_urine_round1_sd.tif ANC_urine_round1_lower.tif ANC_urine_round1_median.tif ANC_urine_round1_upper.tif ANC_urine_round2.tif ANC_urine_round2_sd.tif ANC_urine_round2_lower.tif ANC_urine_round2_median.tif ANC_urine_round2_upper.tif ANC_urine_change.tif ANC_urine_change_sd.tif ANC_urine_change_lower.tif ANC_urine_change_median.tif ANC_urine_change_upper.tif	The proportion of women with a live birth in the five years preceding the survey who received antenatal care for the most recent birth with urine sample taken. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
C_Prev_round1.tif C_Prev_round1_sd.tif C_Prev_round1_lower.tif C_Prev_round1_median.tif C_Prev_round1_upper.tif C_Prev_round2.tif C_Prev_round2_sd.tif C_Prev_round2_lower.tif C_Prev_round2_median.tif C_Prev_round2_upper.tif C_Prev_change.tif C_Prev_change_sd.tif C_Prev_change_lower.tif C_Prev_change_median.tif C_Prev_change_upper.tif	The proportion of currently married or in union women currently using any modern method of contraception. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
Child_m_15_49_round1.tif Child_m _15_49_round1_sd.tif Child_m_15_49_round1_lower.tif Child_m_15_49_round1_median.tif	The proportion of women whose first marriage or consensual union occurred before the age of 15 over the full sample of women aged 15-49. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95%

Child_m_15_49_round1_upper.tif Child_m_15_49__round2.tif Child_m_15_49_round2_sd.tif Child_m_15_49_round2_lower.tif Child_m_15_49_round2_median.tif Child_m_15_49_round2_upper.tif Child_m_15_49_change.tif Child_m_15_49_change_sd.tif Child_m_15_49_change_lower.tif Child_m_15_49_change_median.tif Child_m_15_49_change_upper.tif	credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
Child_m_20_24_round1.tif Child_m _15_49_round1_sd.tif Child_m_20_24_round1_lower.tif Child_m_20_24_round1_median.tif Child_m_20_24_round1_upper.tif Child_m_20_24__round2.tif Child_m_20_24_round2_sd.tif Child_m_20_24_round2_lower.tif Child_m_20_24_round2_median.tif Child_m_20_24_round2_upper.tif Child_m_20_24_change.tif Child_m_20_24_change_sd.tif Child_m_20_24_change_lower.tif Child_m_20_24_change_median.tif Child_m_20_24_change_upper.tif	The proportion of women whose first marriage or consensual union occurred before the age of 18 over the sample of women aged 20-24. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
Labour_fem_round1.tif Labour_fem_round1_sd.tif Labour_fem_round1_lower.tif Labour_fem_round1_median.tif Labour_fem_round1_upper.tif Labour_fem_round2.tif Labour_fem_round2_sd.tif Labour_fem_round2_lower.tif Labour_fem_round2_median.tif Labour_fem_round2_upper.tif Labour_fem_change.tif Labour_fem_change_sd.tif	The proportion of currently married or in union women employed in the 12 months preceding the survey. The indicator includes those who worked in the past year, those who were currently working and those who have a job but were on leave over the last 7 days. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.

Labour_fem_change_lower.tif Labour_fem_change_median.tif Labour_fem_change_upper.tif	
Min_diet_round1.tif Min_diet_round1_sd.tif Min_diet_round1_lower.tif Min_diet_round1_median.tif Min_diet_round1_upper.tif Min_diet_round2.tif Min_diet_round2_sd.tif Min_diet_round2_lower.tif Min_diet_round2_median.tif Min_diet_round2_upper.tif Min_diet_change.tif Min_diet_change_sd.tif Min_diet_change_lower.tif Min_diet_change_median.tif Min_diet_change_upper.tif	The proportion of children aged 6-23 months who received a minimum acceptable diet. This indicator is a composite of children fed with a minimum dietary diversity and a minimum meal frequency. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
NAR_prim_round1.tif NAR_prim_round1_sd.tif NAR_prim_round1_lower.tif NAR_prim_round1_median.tif NAR_prim_round1_upper.tif NAR_prim_round2.tif NAR_prim_round2_sd.tif NAR_prim_round2_lower.tif NAR_prim_round2_median.tif NAR_prim_round2_upper.tif NAR_prim_change.tif NAR_prim_change_sd.tif NAR_prim_change_lower.tif NAR_prim_change_median.tif NAR_prim_change_upper.tif	The proportion of primary school aged children attending primary school. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
NAR_sec_round1.tif NAR_sec_round1_sd.tif	The proportion of secondary school aged children attending secondary school. The grid

NAR_sec_round1_lower.tif NAR_sec_round1_median.tif NAR_sec_round1_upper.tif NAR_sec_round2.tif NAR_sec_round2_sd.tif NAR_sec_round2_lower.tif NAR_sec_round2_median.tif NAR_sec_round2_upper.tif NAR_sec_change.tif NAR_sec_change_sd.tif NAR_sec_change_lower.tif NAR_sec_change_median.tif NAR_sec_change_upper.tif	level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
Stunting_round1.tif Stunting_round1_sd.tif Stunting_round1_lower.tif Stunting_round1_median.tif Stunting_round1_upper.tif Stunting_round2.tif Stunting_round2_sd.tif Stunting_round2_lower.tif Stunting_round2_median.tif Stunting_round2_upper.tif Stunting_change.tif Stunting_change_sd.tif Stunting_change_lower.tif Stunting_change_median.tif Stunting_change_upper.tif	The proportion of children under 5 years old stunted (below –2 standard deviations of height-for-age according to WHO standard). The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
Teen_Pregn_round1.tif Teen_Pregn_round1_sd.tif Teen_Pregn_round1_lower.tif Teen_Pregn_round1_median.tif Teen_Pregn_round1_upper.tif Teen_Pregn_round2.tif Teen_Pregn_round2_sd.tif Teen_Pregn_round2_lower.tif	The proportion of women between 15-19 years old who have given birth over are pregnant with their first child over the full sample of women aged between 15-49 years old. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the

Teen_Pregn_round2_median.tif Teen_Pregn_round2_upper.tif Teen_Pregn_change.tif Teen_Pregn_change_sd.tif Teen_Pregn_change_lower.tif Teen_Pregn_change_median.tif Teen_Pregn_change_upper.tif	difference between both surveys (change) defined as round 2 - round1.
U_Pregn_round1.tif U_Pregn_round1_sd.tif U_Pregn_round1_lower.tif U_Pregn_round1_median.tif U_Pregn_round1_upper.tif U_Pregn_round2.tif U_Pregn_round2_sd.tif U_Pregn_round2_lower.tif U_Pregn_round2_median.tif U_Pregn_round2_upper.tif U_Pregn_change.tif U_Pregn_change_sd.tif U_Pregn_change_lower.tif U_Pregn_change_median.tif U_Pregn_change_upper.tif	The proportion of births that are either wanted earlier or later than occurred (mistimed) or not wanted at all. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
Wash_sanit_round1.tif Wash_sanit_round1_sd.tif Wash_sanit_round1_lower.tif Wash_sanit_round1_median.tif Wash_sanit_round1_upper.tif Wash_sanit_round2.tif Wash_sanit_round2_sd.tif Wash_sanit_round2_lower.tif Wash_sanit_round2_median.tif Wash_sanit_round2_upper.tif Wash_sanit_change.tif Wash_sanit_change_sd.tif Wash_sanit_change_lower.tif Wash_sanit_change_median.tif	The proportion of households with an improved sanitation facility. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.

Wash_sanit_change_upper.tif	
Wash_water_round1.tif Wash_water_round1_sd.tif Wash_water_round1_lower.tif Wash_water_round1_median.tif Wash_water_round1_upper.tif Wash_water_round2.tif Wash_water_round2_sd.tif Wash_water_round2_lower.tif Wash_water_round2_median.tif Wash_water_round2_upper.tif Wash_water_change.tif Wash_water_change_sd.tif Wash_water_change_lower.tif Wash_water_change_median.tif Wash_water_change_upper.tif	The proportion of households whose main source of drinking water is an improved source. The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1.
Wasting_round1.tif Wasting_round1_sd.tif Wasting_round1_lower.tif Wasting_round1_median.tif Wasting_round1_upper.tif Wasting_round2.tif Wasting_round2_sd.tif Wasting_round2_lower.tif Wasting_round2_median.tif Wasting_round2_upper.tif Wasting_change.tif Wasting_change_sd.tif Wasting_change_lower.tif Wasting_change_median.tif Wasting_change_upper.tif	The proportion of children under 5 years old who are wasted (below –2 standard deviations of weight-for-height according to WHO standard). The grid level (5x5km) estimates (mean, SD, lower 95% credible interval, median, upper 95% credible interval) were modelled from data collected during DHS-7 (round1), DHS-8 (round 2), and the difference between both surveys (change) defined as round 2 - round1

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Suggested Citation

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Source Data

This work is based on the Kenya Demographic Health Survey 7 (DHS7) 2014 and the Kenya DHS8 2022 . The 2014 and 2022 Kenya DHS-7 and DHS-8 were conducted by [1, 2]. Microdata and more information can be found here: https://dhsprogram.com// and on relevant Country Reports [1,2] Indicators were adapted from the open-source code shared by the DHS Program Code Share Project (https://github.com/DHSProgram) [3].

Methods Overview

We constructed spatial binomial generalised linear models for selected health and development indicators collected from 2014 (DHS-7) and 2022 (DHS-8) Kenya along with geospatial covariates representing geographical, environmental and socioeconomic factors that are known to influence the indicators. The constructed models are then fitted in the Bayesian framework using the Integrated Nested Laplace Approximation – Stochastic Partial Differential Equations (INLA-SPDE) method [4, 5]. Grid-level estimates (5x5km resolution surfaces), including the mean, standard deviation, lower 95% credible interval, median, and upper 95% credible interval were calculated using the fitted models.

The code to produce these outputs is available at https://doi.org/10.5281/zenodo/14217826

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References

1. 2014 (DHS-7) Kenya DHS: Kenya National Bureau of Statistics, Ministry of Health/Kenya, National AIDS Control Council/Kenya, Kenya Medical Research Institute, National Council for Population and Development/Kenya, and ICF International. 2015. Kenya Demographic and Health Survey 2014 [DATASETS]. Rockville, MD, USA: Kenya National Bureau of Statistics, Ministry of Health/Kenya, National AIDS Control Council/Kenya, Kenya Medical Research Institute, National Council for Population and Development/Kenya, and ICF International.
2. 2022 (DHS-8) Kenya DHS: KNBS and ICF. 2023. Kenya Demographic and Health Survey 2022: [DATASETS]. Nairobi, Kenya, and Rockville, Maryland, USA: KNBS and ICF.
3. The DHS Program Code Share Project, Code Library, DHS Program, 2022. DHS Program GitHub site. https://github.com/DHSProgram.
4. Rue, H., Martino, S. and Chopin, N., 2009. Approximate Bayesian inference for latent Gaussian models by using integrated nested Laplace approximations. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, *71*(2), pp.319-392.
5. Lindgren, F., Rue, H. and Lindström, J., 2011. An explicit link between Gaussian fields and Gaussian Markov random fields: the stochastic partial differential equation approach. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, *73*(4), pp.423-498.