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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our Editorial Policies and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed	
☒	☐	The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☒	☐	A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒	The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒	A description of all covariates tested
☒	☐	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒	A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒	For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☒	☐	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐	For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☐	☒	Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	Data was acquired from the Demographic and Health Surveys platform. Data collection was done using the computer-assisted personal interviewing (CAPI) running the CSPro software.
Data analysis	All modelling and statistical analysis was performed using R (version 4·3·1) with packages multilevLCA (2.0.1), survey (4.4.2), svrepmisc (0.2.2), and healthequal (1.0.1). Data preprocessing and visualizations were generated using python (version 3.11.5) with packages pandas (2.2.3), and matplotlib (3.9.2).

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

The datasets analyzed in this study are publicly available and can be accessed through the DHS Program website (https://dhsprogram.com/).

Research involving human participants, their data, or biological material

Policy information about studies with human participants or human data. See also policy information about sex, gender (identity/presentation), and sexual orientation and race, ethnicity and racism.

Reporting on sex and gender	The study included 54.5% male babies, however no statistically significant associations were found between sex and the utilization subgroups. Since the study sample included even distribution of male and female babies, these findings apply to both sexes. The sex of the each baby was determined based on the mother's self-report. No disaggregated analysis of sex was performed.
Reporting on race, ethnicity, or other socially relevant groupings	We used mother's employment status, education level, wealth quintile, and rural versus urban residence as proxies for socioeconomic status. All data was collected by self-reports from the mothers interviewed. In a multivariate multinomial regression model assessing the association of social economic status with health services utilization subgroups, we included mother's age, marital status, maternal parity , and child sex to control for confounding factors. Race and ethnicity were not considered in this study.
Population characteristics	See above.
Recruitment	The dataset used in this study was obtained from the Demographic and Health Surveys (DHS) program. The study included 31 sub-Saharan African Datasets from surveys conducted between 2014 and May 2024. The surveys use similar multi-stage cluster sampling method to select women of reproductive age (15-49 years) and children under five years for inclusion. Our focus was exclusively on births that ended in under-five mortality, specifically the last birth for each woman. The final dataset included 9,307 births meeting these criteria.
Ethics oversight	Ethical approval and oversight were provided by the respective national agencies that conducted the DHS surveys.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences ☒ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	The study is a quantitative cross-sectional analysis utilizing publicly available data from the Demographic and Health Surveys (DHS) program. It employed a combination of multilevel latent class analysis and multivariable multinomial regression analysis to identify and predict maternal, newborn, and child health intervention utilization patterns based on socioeconomic indicators.
Research sample	The research sample included 9,307 births that ended in under-five mortality (U5M) from 31 sub-Saharan African countries, collected between 2014 and May 2024. These births were the last birth recorded for each woman, selected as this was where most relevant utilization indicators were available. The sample is representative of the population as the DHS program uses multi-stage cluster sampling, a method designed to be nationally representative of women of reproductive age (15-49 years) and children under five years of age in low- and middle-income countries.
Sampling strategy	The DHS program utilizes a convenient and practical sample selection procedure for household based surveys developed on the basis of experience from past surveys—a two-stage cluster sampling procedure. A cluster is a group of adjacent households which serves as the Primary Sampling Unit (PSU) for field work efficiency. Interviewing a certain number of households in the same cluster can reduce greatly the amount of travel and time needed during data collection. In most cases, a cluster is an Enumeration Area (EA) with a measure of size equal to the number of households or the population in the EA, provided by the population census. At the first stage, a stratified sample of EAs is selected with probability proportional to size (PPS): in each stratum, a sample of a predetermined number of EAs is selected independently with probability proportional to the EA's measure of size. In the selected EAs, a listing procedure is performed such that all dwellings/households are listed. This procedure is important for correcting errors existing in the sampling frame, and it provides a sampling frame for household selection. At the second stage, after a complete household listing is conducted in each of the selected EAs, a fixed (or variable) number of households is selected by equal probability systematic sampling in the selected EAs. In each selected household, a household questionnaire is completed to identify women age 15-49, and children under age five. Every eligible woman is interviewed with an individual questionnaire.
Data collection	Data collection was conducted by the DHS program through survey questionnaires, using computer tablets to enable computer-assisted personal interviewing. Surveys were administered face-to-face by trained interviewers, with data gathered on mothers and their children. Information was collected using structured questionnaires during interviews, and responses were self-reported by the participants.

	Blinding to experimentation is not applicable to this study, as it was not a randomized control trial.
Timing	The data collection period for the data used in this study by country is: Angola (November 2015 - February 2016); Burkina Faso (July 2021 - December 2021); Benin (November 2017 - February 2018); Burundi (October 2016 - February 2017); Dem. Rep. Congo (August 2013 - February 2014); Cote d'Ivoire (September 2021 - December 2021); Cameroon (June 2018 - December 2018); Ethiopia (January 2016 - June 2016); Gabon (January 2020 - October 2021); Ghana (October 2022 - January 2023); Gambia (November 2019 - March 2020); Guinea (February 2018 - June 2018); Kenya (February 2022 - July 2022); Liberia (October 2019 - February 2020); Lesotho (September 2014 - December 2014); Madagascar (March 2021 - July 2021); Mali (August 2018 - November 2018); Mauritania (November 2019 - April 2021); Malawi (October 2015 - February 2016); Mozambique (July 2022 - March 2023); Nigeria (August 2018 - December 2018); Rwanda (November 2019 - July 2020); Sierra Leone (May 2019 - August 2019); Senegal (April 2019 - December 2019); Chad (October 2014 - April 2015); Togo (November 2013 - April 2014); Tanzania (March 2022 - July 2022); Uganda (June 2016 - December 2016); South Africa (June 2016 - November 2016); Zambia (July 2018 - January 2019); and Zimbabwe (July 2015 - December 2015).
Data exclusions	No data were excluded from the analysis, as all births that ended in U5M and met the inclusion criteria (i.e., being the last birth in the last five years of the mother) were included. Any missing values were handled using mode imputation for categorical data.
Non-participation	This study used secondary data from the DHS program, and as such, there were no participants who declined participation directly to the researchers conducting this analysis. The DHS program accounted for non-participation during data collection, but this was beyond the scope of this secondary analysis.
Randomization	Participants were not allocated into experimental groups since this was an observational study using existing survey data. No randomization was conducted.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Plants

Seed stocks	N/A
Novel plant genotypes	N/A
Authentication	N/A