Prevalence and associated factors of common childhood illnesses in sub-Saharan Africa from 2010 to 2020: a cross-sectional study

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ABSTRACT

Objective This study aimed to assess the prevalence and determinants of common childhood illnesses in sub-Saharan Africa.

Design Cross-sectional study.

Setting Sub-Saharan Africa.

Participants Under-5 children.

Primary outcome Common childhood illnesses.

Methods Secondary data analysis was conducted using data from recent Demographic and Health Survey datasets from 33 sub-Saharan African countries. We used the Kids Record dataset file and we included only children under the age of 5 years. A total weighted sample size of 208,415 from the pooled (appended) data was analysed. STATA V.14.2 software was used to clean, recode and analyse the data. A multilevel binary logistic regression model was fitted, and adjusted OR with a 95% CI and p value of ≤0.05 were used to declare significantly associated factors. To check model fitness and model comparison, intraclass correlation coefficient, median OR, proportional change in variance and deviance (−2 log-likelihood ratio) were used.

Result In this study, the prevalence of common childhood illnesses among under-5 children was 50.71% (95% CI: 44.18% to 57.24%), with a large variation between countries which ranged from Sierra Leone (23.26%) to Chad (87.24%). The prevalence among the countries was higher than two decades behind the world average, which achieved 1 in 13 rates by 2013.12 Under-5 children are especially vulnerable to infectious diseases including acute respiratory infections (ARIs), diarrhoea, pneumonia and fever, which are all preventable and treatable.3–5 Mortality and morbidity among children vary by age and younger children are especially prone to getting sick as their bodies build immunity to infections. The Millennium Development Goal of under-5 mortality reduction was met and a new goal has been set to reduce it to 25 per 1000 live births or less by 2030.6–8 Sub-Saharan Africa (SSA) remains with the highest childhood deaths from infectious causes. In this region, under-5 children mortality is 20 times higher compared with high-income countries.1 In 2019, the SSA region recorded an average under-5 mortality rate of 76 deaths per 1000 live births, which means 1 child in 13 dies before reaching the age of 5 years.9 Surprisingly, this number is higher than two decades behind the world average, which achieved 1 in 13 rates by 1995.10,11 It is expected that the under-5

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The findings were supported by large datasets covering 33 countries in sub-Saharan Africa.
⇒ The data were collected using a common internationally acceptable methodological procedure.
⇒ The Demographic and Health Survey (DHS) year variation among the countries may affect this result.
⇒ DHS used a cross-sectional survey design, and the causal relationship between childhood illnesses and the independent variables cannot be established.

BACKGROUND

Although child morbidity and mortality have decreased over the past decades, their global prevalence remains high. In 2018, about 5.3 million children died before reaching their fifth birthday across the globe, a decrease from 6.3 million in 2013.12 Under-5 children are especially vulnerable to infectious diseases including acute respiratory infections (ARIs), diarrhoea, pneumonia and fever, which are all preventable and treatable.3–5 Mortality and morbidity among children vary by age and younger children are especially prone to getting sick as their bodies build immunity to infections. The Millennium Development Goal of under-5 mortality reduction was met and a new goal has been set to reduce it to 25 per 1000 live births or less by 2030.6–8 Sub-Saharan Africa (SSA) remains with the highest childhood deaths from infectious causes. In this region, under-5 children mortality is 20 times higher compared with high-income countries.1 In 2019, the SSA region recorded an average under-5 mortality rate of 76 deaths per 1000 live births, which means 1 child in 13 dies before reaching the age of 5 years.9 Surprisingly, this number is higher than two decades behind the world average, which achieved 1 in 13 rates by 1995.10,11 It is expected that the under-5
population in the SSA region will increase to roughly 199 million by 2030.\textsuperscript{12} This requires a strong health delivery system and meaningful child survival interventions to accelerate the pace of child mortality decline.\textsuperscript{11}

Tragically, the goal of ending preventable childhood mortality and morbidity is hindered by significant inequalities among countries. Special attention should be given to the SSA region, where child mortality rates are highest.\textsuperscript{13,14} Previous studies have shown that community and household-level factors have the highest impact on child mortality and morbidity due to ARIs, diarrhoea and fever.\textsuperscript{15} Childhood illnesses are also based on where children were born and lived, the age of the child and the region. Moreover, low socioeconomic status such as low family wealth index and community-level poverty, as well as low educational attainment of the child’s parents, were consistently reported factors for the high prevalence of childhood illnesses.\textsuperscript{16–19}

The WHO endorses the implementation of Integrated Management of Childhood Illness to prevent the most lethal childhood diseases.\textsuperscript{20,21} Adequate understanding of the socioeconomic, environmental and cultural factors is important to successfully prevent childhood illnesses.\textsuperscript{22,23} Until recently, information regarding morbidity and mortality due to childhood illnesses was derived from health facilities, although many children do not seek medical attention.\textsuperscript{24,25} Hospital and clinic records may not be representative for estimating the burden of childhood diseases and could not provide a panoramic view.

In view of the above and to prevent child death due to common childhood illnesses such as ARIs, diarrhoea and fever in SSA, it is essential to expand our understanding of the current prevalence and associated determinants. Thus, the purpose of our study was to assess the prevalence of common childhood illnesses and associated factors among children younger than 5 years of age, by using data from nationally representative surveys of SSA.

**MATERIALS AND METHODS**

**Study design, setting and period**

We used the Demographic and Health Survey (DHS) data which were collected using a cross-sectional study design. The DHS is a nationwide survey that collects data on
maternal and child health, fertility, reproductive health, nutrition and adult self-reported health behaviours. In this study, we included 33 SSA countries which have recent DHS data. Therefore, the current study was based on DHS data which were conducted between 2010 and 2020 in SSA countries (figure 1).

Data source and measurements
The data for this study were drawn from recent nationally representative DHS data conducted in 33 countries in SSA. The DHS is routinely collected every 5 years across low/middle-income countries using structured, pretested and validated tools. These datasets were appended together to investigate the prevalence of common childhood illnesses and associated factors among under-5 children in SSA. The DHS employs a stratified two-stage sampling technique in each country. In the first stage, Enumeration Areas were randomly selected, while in the second stage households were selected by systematic sampling. We used the Kids Record (KR) dataset file and we included only children under age 5 years with at least one of the three diseases (ARI, diarrhoea, fever) at any time in the 2 weeks preceding each survey. Therefore, the total weighted sample size from the pooled (appended) data analysed in this study was 208 415.

Definition of variables
Outcome variable
The dependent variable in this study was common childhood illnesses among under-5 children. The DHS has recorded common childhood diseases such as ARI, diarrhoea and fever in its survey. In this study, the child had an illness when he/she encountered at least one of the three childhood illnesses (ARI, diarrhoea, fever) and categorised as ‘yes’, while those who had none of them were categorised as ‘no’. For the ith children, the dependent variable was represented by a random variable Yi, with two possible values coded as 1 and 0. Therefore, Yi=1 if the child had at least one of the illnesses (ARI, diarrhoea, fever) while Yi=0 if the child had none of the three illnesses.

Independent variables
Major explanatory variables were considered on two levels. Individual-level variables included maternal and child characteristics as well as household characteristics. Those factors were maternal age, maternal education, marital status, currently breastfeeding, wealth index, family size, media access, household had electricity, household had a refrigerator, source of drinking water, type of toilet facility and floor material. On the other hand, place of residence (urban, rural), community poverty level (low, high), community literacy level (low, high) and community media exposure (low, high) were considered as the community-level factors. To generate community-level variables (community media exposure, community poverty and community women’s education), we did an aggregation of individual-level variables at the cluster level and categorised them as higher or lower based on a median value. Residence, which is a direct community-level variable, was used without any manipulation.

Operational definitions
Media exposure was generated from women’s responses to the questions related to the frequency of listening to the radio, watching television and reading newspapers in a week. It is categorised as ‘yes’ if women had exposure to at least one type of media: radio, newspaper or television, and ‘no’ otherwise.

The wealth index was categorised into three: ‘poor’ (poorer and poorest), ‘middle’ and ‘rich’ (richer and richest).

The type of toilet facility was categorised as improved and unimproved according to DHS.26

Community-level women’s education refers to the proportion of women in the community who have formal education (primary and above). It was categorised as low if communities in which <50% of respondents had formal education and high if ≥50% of respondents had attended formal education.

Community-level poverty refers to the proportion of women in the community who had low wealth quintiles (poorest and poorer). It was categorised as low if the proportion of low wealth quintile households was <50% and high if the proportion was ≥50%.

Community-level media usage is the proportion of women in the community who use radio, TV and newspaper, and it was categorised as low community-level media usage and high community-level media usage.

‘Low’ refers to communities in which <50% of respondents had media access while ‘high’ indicates communities in which ≥50% of respondents had media access.

Statistical analyses
We extracted datasets from 33 SSA countries’ KR data files and appended them to generate pooled data. STATA V.14.2 was used to clean, recode and analyse the data. A multilevel binary logistic regression model was fitted to identify significantly associated factors with common childhood illnesses. Four models were constructed which comprised the null model (model 0) without any explanatory variables, model I with individual independent variables only, model II with community-level factors only, and model III with both individual-level and community-level variables. Since the models were nested, comparison was made using deviance (~2 loglikelihood) and model III was the best. Intra-cluster correlation coefficient (ICC), median OR (MOR) and proportional change in variance (PCV) were applied to measure the degree of heterogeneity and variation between clusters. All variables with a p value of ≤0.2 in the bivariable analysis were fitted in the multivariable model. Adjusted OR (AOR) with 95% CI and p<0.05 were presented to reveal significantly associated factors. The multicollinearity test was carried out using the variance inflation factor (VIF), and multicollinearity was not found because all variables have VIF <5.
Patient and public involvement
As our study used secondary analysis of DHS data, participants and the public were not involved in the study design or planning of the study. The study participants were not consulted to interpret the results and write or edit this document for readability or accuracy.

RESULTS
Descriptive characteristics of the study participants
A total of 208,415 under-5 children in 33 SSA countries were included. Chad (87.24%) had the highest prevalence of common childhood illnesses while Sierra Leone (23.26%) had the lowest prevalence (table 1). Of the total, 86,901 (41.7%) were from East Africa and 84,084 (40.3%) from West Africa. The majority of study participants (66.58%) were rural residents with no electricity (66.59%), no refrigerator (86.43%) and had substandard floor material (55.62%). Most of the participants (48.79%) aged 25–34 years and 36.13% had no formal education, respectively (table 2).

Prevalence of common childhood illnesses in SSA countries
The pooled prevalence of common childhood illnesses was 50.71% (95% CI: 44.18% to 57.24%) in SSA. In the subgroup analysis, the prevalence in DHS data collected between 2016 and 2020 was low (32.11%; 95% CI: 28.11% to 36.11%); while the prevalence was higher in DHS data collected between 2010 and 2015 (73.10%; 95% CI: 64.73% to 81.47%) (figure 2).

Multilevel logistic regression analysis of common childhood illnesses in SSA
Random-effect analysis
In the random-effect analysis result, the ICC value in the null model was 0.08, indicating that 8% of the total

| Sub-Saharan region | Country                  | Weighted sample size (n=208,415) | Prevalence of childhood illness (%) | Study year  |
|--------------------|--------------------------|----------------------------------|-----------------------------------|-------------|
| East Africa        | Burundi                  | 11,541                           | 54.07                             | 2016/2017   |
|                    | Comoros                  | 561                              | 79.91                             | 2012        |
|                    | Ethiopia                 | 9,217                            | 25.94                             | 2016        |
|                    | Kenya                    | 6,808                            | 71.63                             | 2014        |
|                    | Malawi                   | 14,874                           | 44.55                             | 2015/2016   |
|                    | Mozambique               | 1,405                            | 78.95                             | 2015        |
|                    | Rwanda                   | 7229                             | 30.03                             | 2018/2020   |
|                    | Tanzania                 | 8,499                            | 27.74                             | 2015/2016   |
|                    | Uganda                   | 13,013                           | 47.76                             | 2016        |
|                    | Zambia                   | 8,325                            | 27.27                             | 2018        |
|                    | Zimbabwe                 | 5,429                            | 31.70                             | 2015        |
| Southern Africa    | Lesotho                  | 834                              | 59.83                             | 2014        |
|                    | Namibia                  | 1,376                            | 78.01                             | 2013        |
|                    | South Africa             | 3,080                            | 29.49                             | 2016        |
| West Africa        | Burkina Faso             | 1,425                            | 82.74                             | 2010        |
|                    | Benin                    | 11,262                           | 28.38                             | 2017/2018   |
|                    | Côte d’Ivoire            | 1,463                            | 80.11                             | 2011/2012   |
|                    | Ghana                    | 751                              | 72.07                             | 2014        |
|                    | Gambia                   | 6,386                            | 31.95                             | 2019/2020   |
|                    | Guinea                   | 6,259                            | 29.50                             | 2018        |
|                    | Mali                     | 8,443                            | 29.12                             | 2018        |
|                    | Nigeria                  | 27,611                           | 32.98                             | 2018        |
|                    | Niger                    | 1,741                            | 78.60                             | 2012        |
|                    | Sierra Leone             | 7,880                            | 23.26                             | 2019        |
|                    | Senegal                  | 4,835                            | 25.58                             | 2019        |
|                    | Togo                     | 1,732                            | 74.80                             | 2013/2014   |
|                    | Liberia                  | 4,298                            | 36.44                             | 2019/2020   |
| Central Africa     | Angola                   | 11,165                           | 27.30                             | 2015/2016   |
|                    | Democratic Republic of the Congo | 52,645                      | 76.41                             | 2013/2014   |
|                    | Congo                    | 2,129                            | 75.28                             | 2011/2012   |
|                    | Cameroon                 | 8,388                            | 26.57                             | 2018        |
|                    | Gabon                    | 1,889                            | 69.19                             | 2012        |
|                    | Chad                     | 3,289                            | 87.24                             | 2014/2015   |
variability in common childhood illnesses was attributable to between-cluster variability, while about 92% was attributable to individual differences. The MOR in the null model was 1.28, which indicates that if we randomly pick a child from two separate clusters, a child with a higher probability of childhood illness in the cluster had a 1.28 times higher probability of being infected than a child with lower childhood illnesses in the cluster. Model III was the best-fitted model since it has the highest log-likelihood (−137 159) and the lowest deviance (274 318) value. The PCV in model III was 73.3%, meaning that about 73.3% of the total variability in the common childhood illnesses was explained by the full model (table 3).

Fixed-effect analysis
In the multilevel multivariable logistic regression model, the age of mothers, maternal education, currently breast feeding, wealth index, family size, media exposure, household had electricity, household had a refrigerator, type of toilet facility, floor material, residence, community women’s education and community poverty were statistically associated with common childhood illnesses in the SSA region. For children from mothers aged 25–34 and 35–49 years, the odds of common childhood illnesses were decreased by 23% and 38% (AOR=0.77; 95% CI: 0.75 to 0.79 and AOR=0.62; 95% CI: 0.60 to 0.65), respectively. The odds of childhood illnesses were 1.20 times higher

Table 2  Sociodemographic and household characteristics of respondents in SSA

| Variables                          | Categories                  | Unweighted frequency (%) | Weighted frequency (%) |
|------------------------------------|-----------------------------|--------------------------|------------------------|
| Age of mothers                     | 15–24                       | 57 926 (27.63)           | 57 065 (27.38)         |
|                                    | 25–34                       | 101 221 (48.29)          | 101 684 (48.79)        |
|                                    | 35–49                       | 50 472 (24.08)           | 49 665 (23.83)         |
| Mothers’ educational level         | No education                | 77 313 (36.88)           | 75 301 (36.13)         |
|                                    | Primary education           | 73 065 (34.86)           | 72 367 (34.72)         |
|                                    | Secondary and above         | 59 241 (28.26)           | 60 747 (29.15)         |
| Mothers’ marital status            | Married                     | 147 209 (70.23)          | 146 810 (70.44)        |
|                                    | Not married                 | 62 410 (29.77)           | 61 605 (29.56)         |
| Currently breast feeding           | No                          | 100 692 (48.04)          | 100 142 (48.05)        |
|                                    | Yes                         | 108 927 (51.96)          | 108 273 (51.95)        |
| Wealth index                       | Poor                        | 98 396 (46.94)           | 91 524 (43.91)         |
|                                    | Middle                      | 41 762 (19.92)           | 41 839 (20.07)         |
|                                    | Rich                        | 69 461 (33.14)           | 75 052 (36.01)         |
| Family size                        | 1–4                         | 53 347 (25.45)           | 54 247 (26.03)         |
|                                    | 5–10                        | 128 008 (61.07)          | 127 008 (60.94)        |
|                                    | >10                         | 28 264 (13.48)           | 27 160 (13.03)         |
| Media access                       | No                          | 76 870 (36.69)           | 73 898 (35.48)         |
|                                    | Yes                         | 132 629 (63.31)          | 134 401 (64.52)        |
| Household had electricity          | No                          | 143 398 (68.41)          | 138 788 (66.59)        |
|                                    | Yes                         | 66 211 (31.59)           | 69 621 (33.41)         |
| Household had refrigerator         | No                          | 183 442 (87.52)          | 180 112 (86.43)        |
|                                    | Yes                         | 26 164 (12.48)           | 28 281 (13.57)         |
| Source of drinking water           | Unimproved                  | 63 113 (30.11)           | 60 300 (28.93)         |
|                                    | Improved                    | 146 506 (69.89)          | 148 115 (71.07)        |
| Type of toilet facility            | Unimproved                  | 106 586 (50.85)          | 102 322 (49.10)        |
|                                    | Improved                    | 103 033 (49.15)          | 106 093 (50.90)        |
| Floor material                     | Standard                    | 89 827 (42.85)           | 92 490 (44.38)         |
|                                    | Substandard                 | 119 792 (57.15)          | 115 925 (55.62)        |
| Residence                          | Urban                       | 66 039 (31.50)           | 69 657 (33.42)         |
|                                    | Rural                       | 143 580 (68.50)          | 138 758 (66.58)        |
| Community-level women education    | Low                         | 104 554 (49.88)          | 102 378 (49.12)        |
|                                    | High                        | 105 065 (50.12)          | 106 037 (50.88)        |
| Community poverty                  | Low                         | 104 922 (50.05)          | 108 421 (52.02)        |
|                                    | High                        | 104 697 (49.95)          | 99 994 (47.98)         |
| Community-level media usage        | Low                         | 104 607 (49.90)          | 102 141 (49.01)        |
|                                    | High                        | 105 012 (50.10)          | 106 274 (50.99)        |

SSA, sub-Saharan Africa.
among children from mothers whose educational status was primary (AOR=1.20; 95% CI: 1.18 to 1.23) and 1.15 times higher in secondary and above (AOR=1.15; 95% CI: 1.12 to 1.18) education.

This study found that children who are currently being breast fed were 1.14 times more likely to be infected compared with those who are not (AOR=1.14; 95% CI: 1.12 to 1.16); however, this result should be interpreted with caution and the readers should see the argument in the Discussion section. For children from a rich household, the odds of illnesses were decreased by 11% compared with those from a poor household (AOR=0.89; 95% CI: 0.85 to 0.92). The odds of illnesses for children from a family size of 5–10 and >10 were decreased by 14% and 6% (AOR=0.86; 95% CI: 0.84 to 0.88 and AOR=0.94; 95% CI: 0.92 to 0.98), respectively. The odds of illnesses among media-exposed household were decreased by 23% (AOR=0.77; 95% CI: 0.74 to 0.80). The odds of illnesses among children from a household that had electricity, refrigerator and improved toilet facility were decreased by 18%, 13% and 16% (AOR=0.82; 95% CI: 0.79 to 0.84, AOR=0.87; 95% CI: 0.84 to 0.90, and AOR=0.84; 95% CI: 0.83 to 0.86), respectively.

The odds of childhood illnesses among children from a household with substandard floor material were 1.20 times higher (AOR=1.20; 95% CI: 1.17 to 1.23). The odds of illnesses among rural children were 1.06 times higher compared with those from urban areas (AOR=1.06; 95% CI: 1.04 to 1.09). In community women with high education and poverty, the odds of childhood illnesses were 1.13 and 1.16 times higher (AOR=1.13; 95% CI: 1.06 to 1.20 and AOR=1.16; 95% CI: 1.09 to 1.24), respectively (table 3).

**DISCUSSION**

This study revealed that the prevalence of common childhood illnesses (ARI, diarrhoea, fever) in the SSA was 50.71% (95% CI: 44.18% to 57.24%), which indicated childhood illnesses are still a major public health problem in the region. A multilevel logistic regression model was used to identify the determinants of common childhood diseases. As a result, mothers who had attended primary, secondary and higher education, and currently breast feeding, substandard floor material, rural residence, high community women’s education and high community poverty were significantly associated with the higher odds of common childhood illness prevalence. In contrast, older mothers, family size of 5–10, media access, household had electricity, household had a refrigerator and improved toilet facility were significantly associated with lower odds of common childhood illness prevalence.

In this study, children born to mothers aged greater than 25 years had lower odds of childhood illnesses as compared with those aged less than 25 years (AOR=0.82; 95% CI: 0.76 to 0.89). The odds of childhood illnesses among children from a household with substandard floor material were 1.20 times higher (AOR=1.20; 95% CI: 1.17 to 1.23). The odds of illnesses among rural children were 1.06 times higher compared with those from urban areas (AOR=1.06; 95% CI: 1.04 to 1.09). In community women with high education and poverty, the odds of childhood illnesses were 1.13 and 1.16 times higher (AOR=1.13; 95% CI: 1.06 to 1.20 and AOR=1.16; 95% CI: 1.09 to 1.24), respectively (table 3).
### Table 3  Multivariable multilevel logistic regression analysis results of both individual-level and community-level factors associated with common childhood illnesses in sub-Saharan Africa

| Variables                        | Categories      | Null model | Model I      | Model II     | Model III    |
|----------------------------------|-----------------|------------|--------------|--------------|--------------|
|                                  |                 | AOR (95% CI)| AOR (95% CI) | AOR (95% CI) |
| Age of mothers                   | 15–24           | 1          |              |              |              |
|                                  | 25–34           | 0.77 (0.75 to 0.79) | 0.77 (0.75 to 0.79)** |
|                                  | 35–49           | 0.62 (0.60 to 0.65) |              | 0.62 (0.60 to 0.65)** |
| Mothers’ educational level       | No education    | 1          |              |              |              |
|                                  | Primary education| 1.21 (1.18 to 1.23) |              | 1.20 (1.18 to 1.23)** |
|                                  | Secondary and above | 1.14 (1.11 to 1.17) |              | 1.15 (1.12 to 1.18)** |
| Mothers’ marital status          | Married         | 1          |              |              |              |
|                                  | Not married     | 0.98 (0.95 to 1.00) |              | 0.99 (0.96 to 1.01) |
| Currently breast feeding         | No              | 1          |              |              |              |
|                                  | Yes             | 1.14 (1.12 to 1.16) |              | 1.14 (1.12 to 1.16)** |
| Wealth index                     | Poor            | 1          |              |              |              |
|                                  | Middle          | 0.98 (0.95 to 1.00) |              | 0.99 (0.96 to 1.01) |
|                                  | Rich            | 0.87 (0.83 to 0.91) |              | 0.89 (0.85 to 0.92)** |
| Family size                      | 1–4             | 1          |              |              |              |
|                                  | 5–10            | 0.87 (0.85 to 0.89) |              | 0.86 (0.84 to 0.88)** |
|                                  | >10             | 0.96 (0.92 to 0.99) |              | 0.94 (0.92 to 0.98)** |
| Media access                     | No              | 1          |              |              |              |
|                                  | Yes             | 0.76 (0.74 to 0.79) |              | 0.77 (0.74 to 0.80)** |
| Household had electricity        | No              | 1          |              |              |              |
|                                  | Yes             | 0.81 (0.78 to 0.83) |              | 0.82 (0.79 to 0.84)** |
| Household had refrigerator       | No              | 1          |              |              |              |
|                                  | Yes             | 0.86 (0.83 to 0.89) |              | 0.87 (0.84 to 0.90)** |
| Source of drinking water         | Unimproved      | 1          |              |              |              |
|                                  | Improved        | 0.99 (0.96 to 1.01) |              | 1.00 (0.97 to 1.02) |
| Type of toilet facility          | Unimproved      | 1          |              |              |              |
|                                  | Improved        | 0.84 (0.82 to 0.86) |              | 0.84 (0.83 to 0.86)** |
| Floor material                   | Standard        | 1          |              |              |              |
|                                  | Substandard     | 1.21 (1.18 to 1.24) |              | 1.20 (1.17 to 1.23)** |

| Community-level variables        |                 | Null model | Model I      | Model II     | Model III    |
|----------------------------------|-----------------|------------|--------------|--------------|--------------|
|                                  |                 |            | AOR (95% CI) | AOR (95% CI) | AOR (95% CI) |
| Residence                        | Urban           | 1          |              |              |              |
|                                  | Rural           | 1.23 (1.20 to 1.25) | 1.06 (1.04 to 1.09)** |
| Community women’s education      | Low             | 1          |              |              |              |
|                                  | High            | 1.18 (1.10 to 1.26) | 1.13 (1.06 to 1.20)** |
| Community poverty                | Low             | 1          |              |              |              |
|                                  | High            | 1.23 (1.15 to 1.32) | 1.16 (1.09 to 1.24)** |
| Community media exposure         | Low             | 1          |              |              |              |
|                                  | High            | 1.02 (0.96 to 1.09) | 1.03 (0.97 to 1.10) |
| Random effect                    | Variance        | 0.26       | 0.19         | 0.17         | 0.15         |
|                                  | ICC             | 0.08       | 0.06         | 0.05         | 0.04         |
|                                  | MOR             | 1.28       | 1.09         | 1.06         | 1.03         |
|                                  | PCV             | Ref        | 36.84        | 52.94        | 73.3         |
| Model comparison                 | Log-likelihood ratio | –138919 | –137186 | –138680 | –137159 |
|                                  | Deviance        | 277 838   | 274 372     | 277 360     | 274 318     |
|                                  | Mean VIF        | 1.48       | 1.19         | 1.47         |

*P<0.05, **P<0.01, ***P<0.001.

AOR, adjusted OR; ICC, intracluster correlation coefficient; MOR, median OR; PCV, proportional change in variance; VIF, variance inflation factor.
compared with children born to mothers aged 15–24 years. This finding is in agreement with the previous study conducted elsewhere.\textsuperscript{27} It may be because older mothers could have better experience and knowledge about childhood illnesses such as ARI, diarrhoea and fever, how dangerous they are and the need to protect their children. Therefore, older mothers may report a higher frequency of episodes of fever, diarrhoea and ARI than younger women.

This study confirmed the association between maternal education, community education and common childhood illnesses. Higher odds of childhood illnesses were observed among children from women with primary, secondary and higher education compared with those with no education. Additionally, high community women’s education and common childhood illnesses had a positive relationship. This finding is also supported by studies done in Tanzania\textsuperscript{27} and Nigeria.\textsuperscript{28} The possible explanation could be that maternal education contributes to raising the maternal understanding of child health, which in turn contributes to correctly reporting common illnesses that their children had faced. Therefore, mothers with no education may have significantly lower rates of sensitivity in diagnosing childhood illnesses, which in this study found illnesses are lower among children born to illiterate mothers. However, education is strongly linked to healthcare, health behaviours and preventative practices. Therefore, educated women could have better care for their children that results in decreased illnesses of children.

Children from households who had electricity and refrigerator, improved toilet facility and standard floor materials were less likely to have common childhood illnesses compared with their counterparts.\textsuperscript{29–34} Generally, poor quality and inadequate housing contribute to child health problems, while improved housing (with improved sanitation, sufficient living area, access to electricity and refrigerator, and finished building materials) may be protective against several important childhood infectious diseases. Childhood illness is due to exposure to disease-causing organisms; therefore, this perhaps depends on housing conditions and the personal hygiene of the household.

Being a rural resident was associated with higher odds of common childhood illnesses. Our finding was inconsistent with several studies done in Ethiopia,\textsuperscript{31} Nigeria\textsuperscript{35} and Tanzania.\textsuperscript{27} The possible explanation for this could be that in rural areas of the SSA region, people lack clean water, electricity is accessible to very few households, there are no improved toilets compared with the urban areas and generally the living standard is low. Moreover, in rural areas, the prevalence of open defecation is high,\textsuperscript{36} and people often use wood, animal dung, straw and other organic materials as a source of fuel to cook food, which exposes children to illnesses such as diarrhoea, ARI and fever. Therefore, children born from rural residents could be more vulnerable to common illnesses.

Consistent with previous findings,\textsuperscript{37–41} our study revealed that children from families with high household wealth had lower odds of childhood illnesses than children from poor households. Besides, high community poverty increased the odds of common childhood illnesses in the SSA. The possible explanation might be that poverty is strongly associated with food insecurity, living standard and housing conditions, which could greatly affect the well-being of a child. Hence, children from households and communities with low wealth status may not have an access to enough food, clean water, improved toilets, clean house, refrigerator and other basic necessities.

In this study, children from large family sizes had lower odds of childhood illness than children from smaller family sizes. This is probably because a large number of individuals in a household could lead to a greater chance of fetching abundant and clean water, which helps to maintain personal hygiene, clean toilet and good housing condition. However, a small family size could have less chance of being infected as there are fewer members to potentially bring infection.\textsuperscript{42,43} However, quantifying the impact requires an understanding of the difference in the characteristics of the family members such as age, dependency of a family member, education and wealth. Besides the argument, our findings could be precise as we used pooled data from 33 countries with larger sample sizes.

Increased odds of fever, diarrhoea and ARI were reported from currently breastfeeding women compared with their counterparts.\textsuperscript{44} Breast feeding is touted as providing many health benefits to children when mothers have a respiratory infection increased the risk of the child being infected, acting as a proxy for closer contact. Therefore, although breast feeding can be a factor for childhood illness because of the above reasons, it is preventive medicine, especially in the early months of the child. Mothers need to be given support, encouragement and awareness (cleanliness of nipples, wearing a mask for respiratory infections) of healthy breastfeeding practices. We also found a significant relationship between media access and childhood illnesses.

Children born to women who have access to media (TV, newspaper and radio) were less likely to get common childhood illnesses. This might be because the media cover some health-related programmes focusing on how to prevent common childhood illnesses. Thus, the likelihood of children being infected by infections could be less among mothers who had access to media.

This study has strengths and limitations. Among the strengths, we used a large sample size by appending 33 countries’ DHS data and fitted the appropriate model to address the DHS data’s hierarchical nature. As a limitation, the DHS year variation may affect this result and could compromise the comparison between countries. Moreover, the DHS used a cross-sectional survey design, and the causal relationship between childhood illnesses...
and the independent variables cannot be established. Bearing these limitations in mind, our study identified important factors of common childhood illnesses and offers a good understanding of their prevalence in SSA countries. Besides, our work, by considering the hierarchical nature of the data (community and individual levels), could provide a robust conclusion and insight into the intervention that targets the individual as well as the community. Finally, we believe the results of this work can be useful for policymakers and programme planners to prioritise countries with a high prevalence of the problem.

CONCLUSIONS

In conclusion, common childhood illnesses in SSA were a major public health problem. Individual-level and community-level variables were found significantly associated determinants of common childhood illnesses in the SSA region. Improving housing conditions, interventions to improve toilets, use of clean water, and strengthening the economic status of the family and the communities are recommended to reduce common childhood diseases.

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