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Assessment of self-medication practices involving antibiotics among children under 5 years of age in the Likasi health zone (Democratic Republic of Congo): a cross-sectional study on the prevalence and socio-cultural and economic determinants

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ABSTRACT

Introduction: Self-medication with antibiotics among children under five years of age poses a major threat to public health, contributing to the emergence of bacterial resistance and exposing children to the risks of adverse effects and treatment failure. In the Democratic Republic of the Congo (DRC), this phenomenon is exacerbated by economic hardship, a weak healthcare system and the proliferation of the informal medicines market. This study aimed to assess the prevalence of self-medication with antibiotics among children under five years of age and to identify the associated sociocultural and economic factors in the Likasi health zone.

Methods: A descriptive and analytical cross-sectional study was conducted among 420 mothers or carers of children under five years of age, selected using a multi-stage probability cluster sampling method. Data were collected using a structured questionnaire administered face-to-face and subsequently analysed using SPSS. Bivariate and multivariate logistic regressions were performed to identify associated factors.

Results: The prevalence of self-medication with antibiotics was 61.7 per cent ($n = 259$). Amoxicillin (22.8 per cent) was the most commonly used drug, mainly to treat coughs, and syrup (65.2 per cent) was the predominant dosage form. The factors significantly associated were: low monthly income ($ORa = 5.2$; 95% CI: 3.0–9.1; $p < 0.001$), a university-level education ($ORa = 2.8$; $p = 0.007$), and a distance to the health centre of > 5 km ($ORa = 1.9$; $p = 0.021$). The mistaken belief in the universal effectiveness of antibiotics was also a major factor (80.0 per cent of self-medication among mothers holding this belief).

Conclusion: Self-medication with antibiotics is an alarming practice in Likasi, driven primarily by economic hardship and popular beliefs. Targeted interventions are urgently needed: strengthening pharmaceutical regulation, policies providing free paediatric care, community-based health education, and the expansion of universal health coverage.

Keywords: Self-medication, antibiotics, children under 5 years of age, sociocultural factors, economic factors, Likasi, Democratic Republic of the Congo, bacterial resistance.

1. Introduction

Antimicrobial resistance (AMR) is recognised by the World Health Organisation (WHO) as one of the top ten threats to public health worldwide (World Health Organisation [WHO], 2025; World Health Organisation [WHO], 2021). The inappropriate use of antibiotics, particularly through self-

medication and overprescription, undermines the management of common infections and jeopardises the progress of modern medicine (WHO, 2025). In sub-Saharan Africa, where access to quality healthcare remains limited and pharmaceutical regulatory systems are often inadequate, self-medication is particularly widespread (Elhaddadi et al., 2024).

Children under the age of 5, due to their immature immune systems and vulnerability to infections (malaria, diarrhoea, respiratory infections), constitute a high-risk target population for exposure to these dangerous practices (Elhaddadi et al., 2024). The pharmacological characteristics of this age group – including immature hepatic metabolism, reduced renal clearance and altered drug distribution – make them particularly vulnerable to dosing errors and serious adverse effects (Di Paolo & Pannatier, 2008; MSD Manuals, 2025).

In the Democratic Republic of the Congo (DRC), this phenomenon is exacerbated by low household purchasing power, frequent stock-outs of essential medicines in public healthcare facilities, and the proliferation of informal medicine markets (Chiribagula et al., 2015; Mboni et al., 2023). The Likasi health zone, situated in Haut-Katanga province, presents a particularly unique context. A quintessential mining town, Likasi has a high population density, a socially diverse population characterised by the coexistence of local communities and migrant workers, and a very active informal economy. These socio-demographic and economic characteristics facilitate easy access to antibiotics without a prescription, via illegal pharmaceutical outlets or street vendors (Katumbo et al., 2020).

However, although self-medication is a recurring topic in health debates in the DRC (Katumbo et al., 2020), little empirical data is available specifically concerning the sociocultural and economic determinants (Cherkaoui et al., 2024) of this practice among young children in Likasi. The rationale for this study therefore rests on the urgent need to fill this knowledge gap, in order to provide local evidence to decision-makers and healthcare professionals for a more rational use of antibiotics in this area (Katumbo et al., 2020; Shembo et al., 2022).

The central research question guiding this investigation was: ‘What are the sociocultural and economic factors associated with the practice of self-medication with antibiotics among children under five years of age in the Likasi health zone?’ (Cherkaoui et al., 2024; Mboni et al., 2023).

2. Methods

2.1. Study setting

The study was conducted in the Likasi health zone, Haut-Katanga province, in the Democratic Republic of the Congo, over a six-month period (January to June 2026). The Likasi health zone comprises one general referral hospital (SNCC Hospital), 10 health areas, 3 referral health centres and 49 private facilities. The total population is estimated at 417,340, with a target population of 78,877 children aged between 0 and 59 months.

2.2. Population and sampling

The target population comprised all mothers/legal guardians of children under 5 years of age who had been residing in the Likasi health zone for at least 6 months. The accessible population consisted of mothers/guardians present in households within the selected health areas at the time of the survey and who had agreed to participate.

Inclusion criteria: (1) mother or legal guardian of a child aged 0 to 59 months; (2) having resided in the health zone for ≥ 6 months; (3) having given verbal or written informed consent.

Exclusion criteria: (1) mother/guardian of a child hospitalised at the time of the survey; (2) mother with mental health conditions preventing her from responding; (3) refusal to participate.

The sample size was determined using Lorenz's formula for descriptive cross-sectional studies: $n = (Z^2 \times p \times q) / d^2$, where $Z = 1.96$ (for a 95 per cent confidence level), $p = 0.50$ (unknown prevalence, maximising sample size), $q = 0.50$, and $d = 0.05$ (5 per cent margin of error). The calculation yielded 384.16, rounded to 420 participants.

A multi-stage probability cluster sampling method was used. In the first stage, health districts were selected at random. In the second stage, streets or blocks were selected at random within each selected health district. At the third stage, a systematic method of household selection was applied, using the 'tossing a bottle' technique to determine the direction, with visits to every house or every other house until the target quota of children under five was reached.

2.3. Data collection

Data were collected using a structured questionnaire administered face-to-face. The questionnaire, developed on the basis of the study's objectives and a review of the

literature, was drafted in French and translated into Swahili for non-French-speaking respondents. It comprised four sections: (1) identification and socio-demographic characteristics; (2) self-medication practices; (3) medicines used; (4) knowledge, attitudes and perceptions. The questionnaire included closed-ended, semi-open-ended and multiple-choice questions.

2.4. Variables

Dependent variable: The practice of self-medication with antibiotics, defined as the administration of an antibiotic to a child under 5 years of age without a medical prescription during the past three months, coded as a binary variable (Yes/No). Secondary variables included the type of antibiotic used and the frequency of use.

Independent variables: The sociocultural dimension comprised the mother's age, educational attainment (none, primary, secondary, university), occupation, and beliefs regarding antibiotics. The economic dimension comprised monthly household income, perception of the cost of healthcare, and health insurance coverage. The geographical dimension comprised the distance to the nearest health centre.

2.5. Data analysis

The data were entered into Microsoft Excel and analysed using SPSS software. Descriptive analysis involved calculating absolute frequencies (n) and percentages (%) for qualitative variables, as well as means and standard deviations for quantitative variables. The prevalence of self-medication was calculated along with its 95 per cent confidence interval (95% CI). For the analytical analysis, Pearson's chi-square test (or Fisher's exact test if the expected frequencies were less than 5) was used for bivariate analysis. The threshold for statistical significance was set at $p < 0.05$. A multivariate logistic regression was performed to adjust for confounding factors and identify the independent determinants of self-medication.

2.6. Ethical considerations

The study was conducted in accordance with the ethical principles of health research. Research authorisation was obtained from the health authorities of the Likasi health zone. Informed consent (verbal/written) was obtained from each mother/guardian after the study objectives had been explained. Anonymity and confidentiality were ensured through the use of codes, with no names recorded on the questionnaires. Participants had the right to withdraw at any time without penalty.

3. Results

3.1. Sample characteristics

A total of 420 mothers/guardians of children under the age of 5 were included in the study. The socio-demographic characteristics are presented in Table 1.

Table 1. Sociodemographic characteristics of participants (N = 420).

Characteristic	n	%
Age of child		
0 to 6 months	106	25.2
Over 6 months to 3 years	166	39.5
Over 3 years to 5 years	148	35.3
Child's gender		
Male	216	51.4
Female	204	48.6
Gender of guardian		
Male	102	24.3
Female	318	75.7
Guardian's level of education		
University/Higher education	250	59.5
Secondary	136	32.4
Primary	22	5.2
Unidentified	12	2.9

Guardian's occupation		
Civil servant	93	22.1
Housewife	78	18.6
Employee	67	16.0
Agriculture/Livestock farming	62	14.8
Retailer	49	11.7
Manual worker	45	10.7
Unemployed	26	6.1

Note: N = 420. The percentages are calculated based on the total sample size.

Of the 420 children, **25.2 per cent** were aged between **0 and 6 months**, **39.5 per cent** were aged between **6 months and 3 years**, and **35.3 per cent** were aged between **3 and 5 years**; boys accounted for **51.4 per cent** of the sample. The majority of respondents were female (**75.7 per cent**). A university or higher level of education was reported by **59.5 per cent** of guardians (or carers), whilst **64.3 per cent** of households reported a monthly income of less than 250,000 FC. Only **26.2 per cent** of them had health insurance or mutual insurance cover. Most households had **between 1 and 3 children (47.4 per cent)**.

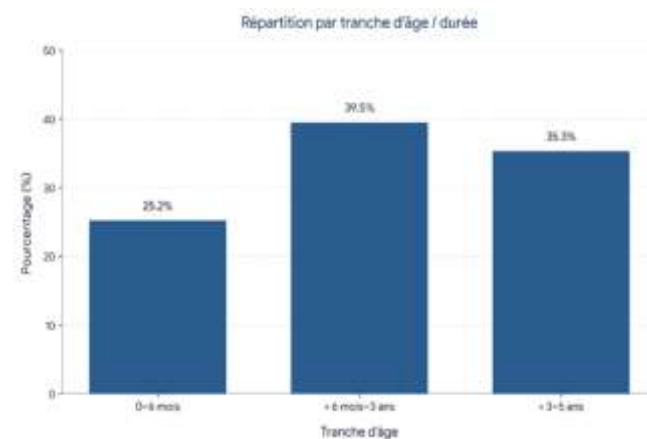


Figure 1. Distribution of children by age group.

3.2. Prevalence of self-medication with antibiotics

Of the 420 children, 259 (61.7 per cent) had been given an antibiotic without a doctor's prescription in the last three months (Table 2). Among the children who had been self-medicated, boys were more numerous (70.7 per cent) than girls (29.3 per cent).

Table 2. Prevalence of self-medication with antibiotics.

Variable	n	%
Self-medication (last 3 months)		
Yes	259	61.7
No	161	38.3
Gender of children who self-medicate (n = 259)		
Male	183	70.7
Female	76	29.3

Note: N = 420 for self-medication; n = 259 for the breakdown by gender.

3.3. Most commonly used antibiotics, sources and reasons

Table 3. Antibiotics used, sources and reasons (n = 259).

Class	Molecule	n (%)	Main source	Predominant reason
Imidazoles	Metronidazole	17 (6.6)	Pharmacy	Diarrhoea
Beta-lactams	Amoxicillin + Clavulanic acid	21 (8.1)	Pharmacy	Persistent cough
	Amoxicillin	59 (22.8)	Pharmacy	Cough
	Cefixime	6 (2.3)	Pharmacy	Fever/Cough

	Penicillin V	29 (11.2)	Pharmacy	Sore throat
Fluoroquinolones + Nitroimidazoles (nitro-5-imidazole)	Norfloxacin-metronidazole	21 (8.1)	Remaining course of treatment	Stomach ache
Macrolides	Erythromycin	31 (12.0)	Pharmacy	Cough
	Azithromycin	24 (9.3)	Pharmacy	Cough
Sulphonamides	Bactrim (Cotrimoxazole)	22 (8.5)	Pharmacy	Pain/Fever
Other	Tetracycline	18 (6.9)	Remaining course of treatment	Diarrhoea
	Nystatin	11 (4.2)	Pharmacy	Wound infection/Thrush

Note: n = 259. The total percentages may exceed 100% due to multiple responses.

Amoxicillin was the most commonly used drug (22.8%), followed by erythromycin (12.0%) and penicillin V (11.2%). Pharmacies were the main source of supply (approximately 78%), and cough was the most common reason for purchase. Syrup was the predominant dosage form (65.2 per cent), followed by suspensions (15.6 per cent) and injectables (13.3 per cent).

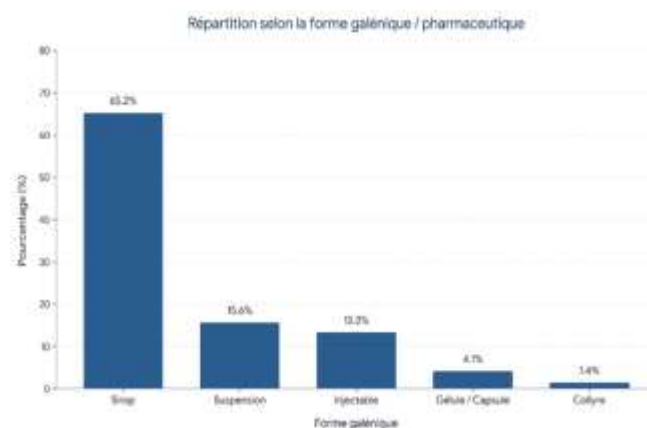


Figure 2. Breakdown of dosage forms used.

3.4. Sociocultural factors associated with self-medication

Table 4. Sociocultural factors associated with self-medication.

Variable	Self-medication: Yes n (%)	Self-medication: No n (%)	Total N (%)
Mother's level of education			
Primary	90 (37.5)	150 (62.5)	240 (100)
Secondary/University	150 (83.3)	30 (16.7)	180 (100)
Family size			
Small family (< 7 people)	140 (70.0)	60 (30.0)	200 (100)
Large family (≥ 7 people)	100 (45.5)	120 (54.5)	220 (100)
Belief: 'Antibiotics cure everything'			
Yes	200 (80.0)	50 (20.0)	250 (100)
No	40 (23.5)	130 (76.5)	170 (100)
Prior use of traditional medicine			
Yes	90 (64.3)	50 (35.7)	140 (100)
No	150 (53.6)	130 (46.4)	280 (100)

Note: N = 420. The percentages are calculated in the table.

The analysis revealed that mothers with secondary or university education practised self-medication in 83.3 per cent

of cases, compared with only 37.5 per cent of mothers with primary education ($p < 0.05$). Belief in the universal effectiveness of antibiotics was the most powerful sociocultural factor: 80.0% of mothers who held this belief practised self-medication, compared with 23.5% of those who did not.

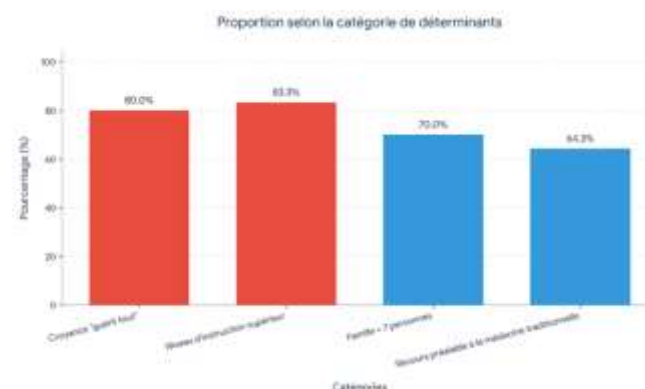


Figure 3. Prevalence of self-medication according to sociocultural factors.

Higher educational attainment and the belief in the total effectiveness of treatment were the main factors observed, with proportions exceeding 80 per cent, followed by family size and prior use of traditional medicine

3.5. Economic factors associated with self-medication

Table 5. Economic characteristics of households (N = 420).

Economic variable	n	%
Monthly household income		
Less than 100,000 FC	120	28.6
100,000 – 250,000 FC	150	35.7
250,000 – 500,000 FC	80	19.0
Over 500,000 FC	70	16.7
Impact of healthcare costs on self-medication		
Never	100	23.8

Rarely	100	23.8
Often	120	28.6
Always	100	23.8
Covered by a private health insurance scheme		
Yes	110	26.2
No	310	73.8

Note: N = 420. FC = Congolese francs.

The economic analysis showed that 52.4 per cent of carers reported that the cost of care ‘often’ or ‘always’ influenced their decision to purchase antibiotics without a prescription. A large majority (73.8 per cent) were not covered by any supplementary health insurance or health insurance scheme. Low income was strongly associated with self-medication.

3.6. Multivariate analysis

Table 6. Results of the multivariate logistic regression analysing the determinants of self-medication.

Explanatory variables	Categorical variables	ORa	95% CI	p
Monthly household income	> 500,000 FC	1 (Ref.)		
	250,000 – 500,000 FC	2.1	1.2 – 3.7	0.009
	100,000 – 250,000 FC	5.2	3.0 – 9.1	< 0.001
	< 100,000 FC	3.4	2.0 – 5.8	< 0.001
Level of education	Secondary	1 (Ref.)		

	University	2.8	1.3 – 6.0	0.007
	Primary	1.5	1.0 – 2.3	0.048
Distance to the health centre	≤ 5 km	1 (Ref.)		
	> 5 km	1.9	1.1 – 3.2	0.021

Note. ORa = adjusted odds ratio; CI = confidence interval; Ref. = reference category; FC = Congolese francs.

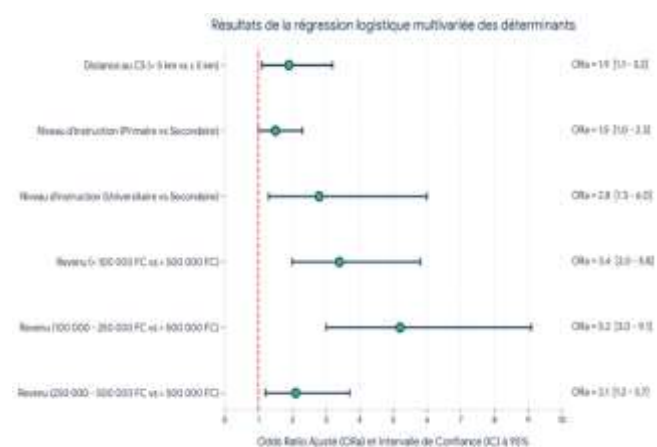


Figure 4. Adjusted odds ratio (ORa) and 95% confidence intervals for determinants of self-medication

Note. The dotted vertical line represents ORa = 1 (no association). The horizontal bars represent the 95% confidence intervals.

The multivariate analysis identified monthly income as the strongest determinant of self-medication. Compared with affluent households (> 500,000 FC), the risk of self-medication was 5.2 times higher in middle-income households (100,000–250,000 FC) and 3.4 times higher in the poorest households (< 100,000 FC) ($p < 0.001$). Mothers with a university education were 2.8 times more likely to practise self-medication ($p = 0.007$) than those with a secondary school education. Living more than 5 km from a health centre increased the risk of self-medication by a factor of 1.9 ($p = 0.021$).

4. Discussion

4.1. Interpretation of the main results

4.1.1. Prevalence of self-medication

The prevalence of 61.7 per cent observed in Likasi is alarming and exceeds the overall estimate of 38.86 per cent (95 per cent CI: 34.32–43.40) for low- and middle-income countries reported by the meta-analysis by Zewdie et al. (2025). This rate is also higher than the African average of 50–60 per cent reported by Yeika et al. (2021) and the 47.7 per cent found in Tanzania by Moshi and Mwanga (2020). It is comparable to the 60 per cent reported in Egypt by Moustafa et al. (2025) and significantly higher than the 15.3 per cent reported in Guinea (Zewdie et al., 2025).

Our result is consistent with national data: 78.3 per cent in Lubumbashi (Katumbo et al., 2020), 94.5 per cent in Mwene-Ditu (Mulangu Musasa et al., 2025), and 99.3 per cent in Uvira (Mboni et al., 2023), confirming that self-medication with antibiotics among children is a deeply ingrained behaviour in the DRC. The slightly lower prevalence in Likasi compared with these other Congolese cities may be explained by differences in the populations studied, the survey periods, or the definitions of self-medication. However, the finding remains deeply concerning: nearly two in three children have been exposed to antibiotics without medical supervision.

4.1.2. The paradox of educational attainment

One of the most striking findings is the paradoxical association between a higher level of maternal education and an increase in self-medication. Mothers with secondary or university education practised self-medication in 83.3 per cent of cases, compared with only 37.5 per cent of mothers with primary education (ORa = 2.8; $p = 0.007$). This counter-intuitive finding is consistent with the conclusions of Mulangu Musasa et al. (2025) in Mwene-Ditu and of Moustafa et al. (2025) in Egypt.

Several explanatory mechanisms can be put forward. Firstly, the ‘knowledge effect’: educated mothers have better access to information about medicines, which may lead them to overestimate their competence in making treatment decisions. Secondly, the economic factor: educated mothers often have higher incomes, which enables them to purchase antibiotics directly from pharmacies without financial constraints. Thirdly, work-related constraints: working women have less time for medical consultations and prefer the convenience of self-medication. Fourthly, overconfidence: a university degree does not confer pharmacological expertise, and

mothers may underestimate the complexity of paediatric antibiotic therapy (Katumbo et al., 2020).

This finding highlights that general education does not automatically translate into health literacy. Specific health education programmes are urgently needed to address medication safety, including amongst educated populations.

4.1.3. Predominance of beta-lactams and risks associated with the use of tetracyclines

The predominance of amoxicillin (22.8 per cent) is consistent with the literature: this compound is effective, well tolerated, available as a syrup, and perceived as a ‘miracle drug’ by the public (Katumbo et al., 2020; Moshi & Mwanga, 2020). The combined use of amoxicillin (22.8 per cent), penicillin V (11.2 per cent) and amoxicillin-clavulanic acid (8.1 per cent) means that beta-lactams account for 44.4 per cent of all antibiotics used for self-medication.

However, the presence of tetracycline (6.9 per cent) is particularly worrying. Tetracyclines are strictly contraindicated in children under 8 years of age due to the risks of permanent tooth discolouration, enamel hypoplasia, and deposition in growing bones, which inhibits ossification (National Academy of Medicine, 2007). Their use for self-medication reflects a serious lack of awareness of the risks specific to paediatrics and unrestricted access to dangerous medicines. This finding highlights the urgent need to strengthen controls in pharmacies and to raise parents’ awareness of the dangers of inappropriate medicines for children (ALLAG, 2023).

4.1.4. The central role of economic factors

The multivariate analysis clearly identified income as the most powerful determinant of self-medication. Compared with affluent households (> 500,000 FC), households with intermediate incomes (100,000–250,000 FC) had a 5.2-fold higher risk ($p < 0.001$) and the poorest households (< 100,000 FC) a 3.4-fold higher risk ($p < 0.001$). This dose-response relationship is consistent with the findings of Chiribagula et al. (2015) in Lubumbashi, where 67.7 per cent of students cited a lack of money as the main reason for self-medication.

Poverty creates a vicious circle: poor households forego formal medical consultations, turn to self-medication, experience treatment failures, see their child’s health deteriorate, and ultimately resort to even more expensive secondary care (hospitalisation). Self-medication is therefore a coping mechanism for poverty which, paradoxically, exacerbates households’ health and financial insecurity (Cherkaoui et al., 2024).

The fact that 73.8 per cent of carers have no health cover and that 52.4 per cent state that the cost of care ‘often’ or ‘always’ influences their decision to buy antibiotics without a prescription reflects the weakness of universal health cover (UHC) in the DRC. The challenges identified for the implementation of UHC in Likasi include obstacles relating to access to care, coverage of vulnerable populations and the mobilisation of the necessary resources (Ibrahima et al., 2023).

4.2. Comparison with other national and international studies

4.2.1. National comparisons

Study	Location	Population	Prevalence
Our study	Likasi	Children aged 0–5	61.7%
Mulangu Musasa et al. (2025)	Mwene-Ditu	Children aged 0–5	94.5%
Katumbo et al. (2020)	Lubumbashi	Children	78.3%
Chiribagula et al. (2015)	Lubumbashi	Students	99.3%
Mboni et al. (2023)	Uvira	Students	99.3%

Our study falls within an intermediate range, closer to Lubumbashi (78.3 per cent) than to Mwene-Ditu (94.5 per cent). These differences may be explained by varying study periods, different definitions (some include all medicines, not just antibiotics), different local contexts (specific characteristics of the mining town of Likasi), and different populations (students versus children).

4.2.2. International comparisons

Study	Location	Population	Prevalence
Our study	Likasi	Children aged 0–5	61.7%
Zewdie et al. (2025)	PRFI	Children	38.86%
Moshi and Mwanga (2020)	Tanzania	Children aged 0–5	47.7%
Elhaddadi et al. (2024)	Morocco	Children	~50 per cent
Moustafa et al. (2025)	Egypt	Children	60 per cent

Our prevalence (61.7 per cent) exceeds the PRFI average (38.86 per cent) (Zewdie et al., 2025) and the rate in Tanzania (47.7 per cent) (Moshi & Mwanga, 2020). It is comparable to that of Egypt (60 per cent) (Moustafa et al., 2025) and higher than that of Morocco (~50 per cent) (Elhaddadi et al., 2024). This relatively high figure reflects the severity of the problem in the DRC, which is one of the countries most affected by self-medication in Africa.

4.2.3. Sociocultural determinants: convergence of results

Several studies are consistent with our findings. Elhaddadi et al. (2024) in Oujda, Morocco, found that a low level of education increased the likelihood of self-medication (OR = 1.02), as did a belief in the effectiveness of antibiotics (58 per cent of parents). Moshi and Mwanga (2020) in Tanzania identified household income, distance to healthcare facilities and knowledge of antibiotics as associated factors. Manegabe et al. (2025) in eastern DRC documented that healthcare providers report widespread self-medication among children, driven by financial constraints, in line with our findings.

The meta-analysis by Yeika et al. (2021) estimates that the median prevalence of paediatric self-medication with antimicrobials in Africa lies between 50 per cent and 60 per cent (median 55.7 per cent). Our observed prevalence of 61.7 per cent exceeds this continental average, suggesting an even more critical situation in the DRC.

4.2.4. Antimicrobial resistance

The WHO has recently warned of widespread resistance to common antibiotics worldwide, with an average annual increase of between 5 per cent and 15 per cent depending on the pathogen-antibiotic combination (WHO, 2025). This resistance is directly linked to the inappropriate use of antibiotics, of which self-medication is a major component. In sub-Saharan Africa, the mortality rate due to antimicrobial resistance is the highest in the world, at 99 deaths per 100,000 people (WHO, 2025; Yeika et al., 2021).

In the DRC, at Saint-Luc Hospital in Kisantu, a peak in antimicrobial resistance observed in 2019 among children under five forced medical teams to adopt a new treatment protocol (WHO, 2022). This situation illustrates the direct link between self-medication, bacterial resistance and childhood morbidity. Ibrahima et al. (2023) at Panda Hospital in Likasi documented a catastrophic in-hospital mortality rate of 36 per cent among children with severe malaria, with those under five being the hardest hit ($p = 0.040$), often exacerbated by inappropriate self-management of treatment at home.

4.3. Implications for practice and health policy

4.3.1. Strengthening pharmaceutical regulation

The predominance of pharmacies as a source of supply (78 per cent) highlights the urgent need to strengthen the regulation of pharmacies. Pharmacists must be reminded of their legal obligations (dispensing on prescription) and deterrent sanctions must be enforced. The 1933 Act regulating the prescription and sale of pharmaceutical products in the DRC (DRC Ministry of Health, 1933) must be updated and rigorously enforced.

4.3.2. Policy on free paediatric care

The significant role played by economic factors argues in favour of targeted free-of-charge policies for primary paediatric care. Exempting children under the age of 5 from consultation and laboratory fees would significantly reduce the financial barrier. Several countries in sub-Saharan Africa (e.g. Senegal, Burkina Faso) have introduced free-of-charge policies for children, with encouraging results.

4.3.3. Community-based health education

Given the significant role played by misconceptions (80.0 per cent of mothers who self-medicate believe that antibiotics ‘cure everything’), community awareness campaigns are essential. Messages must be simple, in local languages (Swahili, Tshiluba, French), and targeted at mothers, fathers

and community leaders. Campaigns should emphasise: the distinction between viral and bacterial infections, the risks of resistance and adverse effects, and the importance of adhering to prescribed treatments (Manegabe et al., 2025).

4.3.4. Expanding universal health coverage

The lack of health cover for 73.8 per cent of guardians highlights the urgent need to extend universal health cover (UHC) in Likasi and across the DRC. UHC would help to reduce out-of-pocket expenditure for households, improve access to care and reduce the reliance on self-medication.

4.3.5. Strengthening surveillance of bacterial resistance

The high prevalence of self-medication with antibiotics suggests intense selective pressure on bacteria. It is essential to strengthen bacterial resistance surveillance systems (e.g. WHONET software, GLASS system) to guide local treatment decisions and adapt national protocols (WHO, 2022).

4.4. Strengths and limitations of the study

4.4.1. Strengths

This study has several notable methodological strengths. Firstly, the sample size (420 participants) exceeds the calculated minimum (384), providing sufficient statistical power. Secondly, multi-stage probability cluster sampling ensures that the health zone is representative, covering both urban and peri-urban areas. Thirdly, the multivariate logistic regression analysis allowed for the adjustment of confounding factors to identify independent determinants. Fourthly, the study provides recent (2026) quantitative and analytical data on a major paediatric health issue in a little-studied Congolese urban context. Fifthly, the multidimensional approach (sociocultural, economic, geographical) reflects the complexity of the determinants of self-medication.

4.4.2. Limitations

Several limitations should be noted. Firstly, selection bias: certain health zones could not be included due to logistical constraints (impassable roads, insecurity), which may have under- or over-represented certain populations. Secondly, recall bias: self-medication was assessed over a three-month period based on mothers’ self-reports, leaving room for memory errors. Thirdly, social desirability bias: given that self-medication is risky, some mothers may have downplayed their responses. Fourthly, limited statistical power for certain sub-categories (e.g. primary school level at 5.2 per cent). Fifthly, the cross-sectional nature of the study does not allow causal relationships to be established. Sixthly, the study relied

exclusively on mothers' self-reports without biological confirmation of the presence of antibiotics. Seventhly, the study did not incorporate the perspective of the children themselves (for the older children).

5. Conclusion

This study, conducted in the Likasi health zone, aimed to assess the extent of and identify the factors influencing the self-medication of children under five with antibiotics. On completion of our work, we conclude that:

1. **Alarming prevalence:** 61.7 per cent of children under the age of five had been given an antibiotic without a medical prescription in the last three months, placing Likasi amongst the high-risk areas for self-medication in the DRC.
2. **Predominant antibiotics:** Beta-lactams, and in particular amoxicillin (22.8 per cent), dominate self-medication, followed by macrolides (erythromycin 12.0 per cent, azithromycin 9.3 per cent). The presence of tetracycline (6.9 per cent), which is contraindicated in children under 8 years of age, is particularly worrying.
3. **Economic determinants:** Monthly income is the most powerful determinant, with a 5.2-fold increased risk in middle-income households and a 3.4-fold increased risk in the poorest households. The lack of health insurance (73.8 per cent) and the perception that healthcare is expensive (52.4 per cent) reinforce this finding.
4. **Sociocultural determinants:** Paradoxically, a high level of education is associated with greater self-medication (83.3 per cent), as is the mistaken belief in the universal effectiveness of antibiotics (80.0 per cent).
5. **Geographical determinants:** A distance of more than 5 km from a health centre increases the risk of self-medication by a factor of 1.9 ($p = 0.021$), highlighting the importance of access to healthcare facilities.

Answer to the research question

Our research question was: 'What are the sociocultural and economic factors associated with the practice of self-medication with antibiotics among children under five in the Likasi health zone?'

The answer is clear: self-medication with antibiotics in Likasi is a multifactorial phenomenon driven by three key factors: (1) economic hardship (a major financial barrier), (2) popular beliefs (social perceptions of illness and medicines), and (3) limited access to healthcare (geographical distance and inadequate infrastructure). These factors interact with one another: poverty reinforces misconceptions (parents seek 'quick and cheap' solutions), geographical remoteness discourages people from seeking medical advice, and the lack of regulation allows unrestricted access to antibiotics.

6. Recommendations

6.1. To the health authorities (health district, Ministry):

1. Strengthen inspection controls in private pharmaceutical establishments to halt the over-the-counter sale of antibiotics and penalise offenders in accordance with the 1933 Act and its subsequent amendments.
2. Promote policies of universal access to healthcare or targeted free care for paediatric conditions in children under 5 years of age (exemption from payment for consultations and essential medicines).
3. Develop a local plan to combat antimicrobial resistance, incorporating resistance surveillance, training for prescribers and public awareness campaigns.
4. Decentralise health services by establishing local health centres to reduce geographical distances in outlying areas.
5. Strengthen the health information system to ensure epidemiological monitoring of resistant infections.

6.2. To healthcare professionals:

1. Adhere to the rational prescribing of antibiotics, in accordance with national protocols and the WHO's AWaRe classification (WHO, 2019).
2. Systematically educate parents during consultations on the distinction between viral and bacterial infections, the risks of self-medication and the importance of treatment adherence.
3. Train and actively involve community health workers (RECOs) to disseminate prevention messages in neighbourhoods and villages.

4. Conduct awareness-raising campaigns in schools, places of worship and public spaces.

6.3. To the public:

1. Avoid taking antibiotics without medical advice and always consult a qualified healthcare professional at the first sign of illness in a child (persistent fever, prolonged cough, severe diarrhoea, etc.).
2. Do not reuse leftover antibiotics from previous courses of treatment and do not buy antibiotics without a medical prescription.
3. Join mutual health schemes or solidarity schemes to reduce financial barriers to healthcare.
4. Learn about and stay informed on the risks of bacterial resistance through community outreach programmes, local radio stations and health education sessions.

6.4. For future research:

1. Conduct qualitative studies (individual interviews, focus groups) to better understand the sociocultural barriers and mothers' perceptions regarding self-medication.
2. Expand clinical and biological investigations to measure rates of antibiotic resistance among children in the Likasi health zone and assess the impact of self-medication on gut flora and community-acquired infections.
3. Assess the effectiveness of educational interventions implemented by the health authorities (awareness campaigns, training for pharmacists) to gauge their impact on self-medication practices.
4. Repeat the study in other health zones in the DRC (urban, peri-urban and rural) to gain a national perspective on the phenomenon.
5. To investigate the quality of antibiotics available on the informal market (counterfeit, out of date, poorly stored) in order to assess any additional risks.

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Ethical statement

The study was conducted in accordance with the ethical principles applicable to research involving human participants. Prior authorisation was obtained from the relevant health authorities in the Likasi health zone. Participants were informed in a clear and comprehensible manner of the aim, nature and procedure of the study. The anonymity and confidentiality of the data collected were guaranteed, as was respect for the participants' rights, dignity and freedom of choice.

Declaration of consent

Informed consent, either verbal or written, was obtained from each participant prior to their inclusion in the study. Participants were informed that they could withdraw at any time, without having to give a reason and without any adverse consequences. No personally identifiable data was collected; the information gathered was used exclusively for scientific purposes and stored securely.

References

- National Academy of Medicine. (2007). *From self-diagnosis to self-medication: Risks and impact on the pharmacist-patient relationship*. <https://www.academie-medecine.fr>
- ALLAG, H. (2023). *Antibiotics I: Definitions, classification, modes of action*. University of Constantine 3. <https://facmed.univ-constantine3.dz>
- Cherkaoui, S., Bouaza, S., Barkaoui, M., Rkain, M., & Benajiba, N. (2024). Prevalence and determinants of the use of antibiotics through self-medication in the paediatric population in Oujda, Morocco.

- Chiribagula, V. B., Mboni, H. M., Amuri, S. B., Kamulete, G. S., Byanga, J. K., Duez, P., & Simbi, J. B. L. (2015). Prevalence and characteristics of self-medication among students aged 18–35 living on the Kasapa Campus of the University of Lubumbashi. *The Pan African Medical Journal*, 21, Article 107. <https://doi.org/10.11604/pamj.2015.21.107.5651>
- Di Paolo, E., & Pannatier, A. (2008). *Paediatric pharmacy: Specific features and medication risks*. Vaud University Hospital (CHUV). <https://www.chuv.ch>
- Elhaddadi, H., Hamami, A., Sara, A., Elouali, A., Babakhouya, A., & Rkain, M. (2024). Prevalence and determinants of the use of antibiotics through self-medication in the paediatric population in Oujda, Morocco. *Cureus*, 16(5), Article e60126. <https://doi.org/10.7759/cureus.60126>
- Ibrahima, C., Kali, S., Muteta, C., Shongo, D., & Umba, E. (2023). Risk factors for death among children admitted for severe malaria at Panda Hospital in Likasi, Democratic Republic of the Congo. *Health Sciences and Disease*, 24(10). <https://www.hsd-fmsb.org/index.php/hsd/article/view/5003>
- Katumbo, A. M., Tshiningi, T. S., Sinanduku, J. S., Mudisu, L. K., Mwadi, P. M., Mukuku, O., Luboya, O. N., & Malonga, F. K. (2020). The practice of self-medication in children by their mothers in Lubumbashi, Democratic Republic of Congo. *Journal of Advanced Paediatrics and Child Health*, 3(1), 27–31. <https://doi.org/10.17352/2640-7612.000020>
- Manegabe, J. T., Mwangi, R., Mulindwa, J., Sumaili, D., Kapalata, G. M., Andersson, R., Lepp, M., Muro, F., Skovbjerg, S., Emgård, M., & Birindwa, A. M. (2025). Healthcare workers' perspectives on antibiotic utilisation in children under five years of age in the eastern Democratic Republic of the Congo. *Antimicrobial Resistance & Infection Control*, 14, Article 93. <https://doi.org/10.1186/s13756-025-01596-5>
- Mboni, H. M., Tshikongo, A. K., Chirubagula, V. B., Shakalenga, C. M., Kanyege, A. M., Rugema, B. B., Mushobekwa, S. S., Akiba, D. B., & Rusati, N. M. (2023). Assessment of self-medication practices and their characteristics among students in Uvira, Democratic Republic of the Congo. *The Pan African Medical Journal*, 45, Article 53. <https://doi.org/10.11604/pamj.2023.45.53.39690>
- Ministry of Health of the DRC. (1933). *Law regulating the prescription and sale of pharmaceutical products in the Democratic Republic of the Congo* (Ordinance No. 27 bis/Health of 15 March 1933 on the practice of pharmacy). <http://iaphl.org/wp-content/uploads/2016/05/Congo-SCM-DRC-French.pdf>
- Moshi, F. V., & Mwanga, J. R. (2020). Prevalence and factors associated with parents self-medicating under-fives with antibiotics in Bagamoyo District Council, Tanzania: A cross-sectional study. *Patient Preference and Adherence*, 14, 1445–1453. <https://doi.org/10.2147/PPA.S263517>
- Moustafa, A. A. A. E., Madian, A. A., Mokbel, R., El-Ashry, A., & Ouda, M. M. (2025). Influence of mothers' socio-demographic factors on the self-medication of antimicrobials in children under five in Egypt: A cross-sectional nursing study. *Journal of Paediatric Nursing*, 85, 112–120. <https://doi.org/10.1016/j.pedn.2025.01.012>
- MSD Manuals. (2025). *Pharmacokinetics in children*. <https://www.msmanuals.com/fr/professional/pédiatrie>
- Mulangu Musasa, C., Muteba Tshimanga, I., Kamanda Ebondo, A., Mulundu Musasa, P., Badi Ne Bantu, F., Mbaya Tshipata, M., Kabambi Matanda, V., Muamba Musasa, C., & Kazadi Kabeya, T. (2025). Factors explaining self-medication among children aged 0–5 years in the town of Mwene-Ditu in the Democratic Republic of the Congo: A cross-sectional study. *Journal of Nursing and Health Sciences*, 4(1), 26–36. <https://doi.org/10.34874/MIST.PRSM/rsits-v4i1.59847>
- Nelson, A., et al. (2025). Healthcare workers' perspectives on antibiotic utilisation in children under five years of age in the eastern Democratic Republic of the Congo. *Antimicrobial Resistance & Infection Control*, 14, Article 93. <https://doi.org/10.1186/s13756-025-01596-5>

- Ntabangana, P., Mboni, H. M., Tshikongo, A. K., et al. (2023). Evaluation of self-medication practices and their characteristics among students in Uvira, Democratic Republic of the Congo. *The Pan African Medical Journal*, 45, Article 53. <https://doi.org/10.11604/pamj.2023.45.53.39690>
- World Health Organisation. (2021). *Antimicrobial resistance* (Factsheet). <https://www.who.int/fr/news-room/fact-sheets/detail/antimicrobial-resistance>
- World Health Organisation. (2022). *Antimicrobial resistance surveillance in the DRC: A vital public health issue*. <https://www.afro.who.int/fr/countries/democratic-republic-of-congo/news/surveillance-de-la-ram-en-rdc-un-enjeu-vital-de-sante-publique>
- Rashed, A. N., Whittlesea, C., Al-Azzam, S., & Turner, M. A. (2019). Paediatric pharmacokinetics of the antibiotics in the access and watch groups of the 2019 WHO model list of essential medicines for children: A systematic review. *Expert Review of Clinical Pharmacology*, 12(12), 1099–1106. <https://doi.org/10.1080/17512433.2019.1689123>
- Shembo, A. K. P., Musumari, P. M., Srithanaviboonchai, K., Tangmunkongvorakul, A., & Dalleur, O. (2022). A qualitative study on community use of antibiotics in Kinshasa, Democratic Republic of Congo. *PLOS ONE*, 17(4), Article e0267544. <https://doi.org/10.1371/journal.pone.0267544>
- World Health Organisation. (2015). *Global action plan on antimicrobial resistance*. WHO. ISBN 978-92-4-150976-3.
- World Health Organisation. (2019). *AWaRe classification of antibiotics for evaluation and monitoring of use*. WHO. <https://www.who.int>
- World Health Organisation. (2025). *WHO warns of widespread resistance to common antibiotics worldwide*. <https://www.who.int/fr/news/item/13-10-2025-who-warns-of-widespread-resistance-to-common-antibiotics-worldwide>
- Yeika, E. V., Ingelbeen, B., Kimathi, A., Leyens, J., Van Herp, M., & Affolabi, D. (2021). Comparative assessment of the prevalence, practices and factors associated with self-medication with antibiotics in Africa: A systematic review and meta-analysis. *Tropical Medicine and International Health*, 26(8), 862–881. <https://doi.org/10.1111/tmi.13600>
- Zewdie, S., Kassa, A. A., Bizuneh, M. M., Tesfaye, T. C., & Yayehrad, A. T. (2025). Antibiotic use without a prescription among children under 5 years of age in low- and middle-income countries: A systematic review and meta-analysis. *JAC-Antimicrobial Resistance*, 7(3), Article d1af093. <https://doi.org/10.1093/jacamr/d1af093>
- Zewdie, S., Kassa, A. A., Yayehrad, A. T., Bizuneh, M. M., Ayenew, W., Zewdie, M., Mulat, S., Bitew, B. E., Zewdie, S., Meharie, B. G., Tesfaye, T. C., Zerga, A. A., Ayele, F. Y., Toleha, H. N., Workineh, B. D., & Bayked, E. M. (2024). Non-prescription antibiotic use and its predictors among children in low- and middle-income countries: A systematic review and meta-analysis. *Italian Journal of Pediatrics*, 50, Article 260. <https://doi.org/10.1186/s13052-024-01808-5>