





personnel was significantly associated with non-adherence in both cities.

**Table 1.** Socio-demographic characteristics of participants by city.

Variable	Kolwezi (n = 126)	Lubumbashi (n = 140)	p-value
Average age (± SD)	34.8 ± 11.2	32.6 ± 10.5	0.12
Male sex, n (%)	72 (57.1)	78 (55.7)	0.81
Married, n (%)	64 (50.8)	59 (42.1)	0.15
Education level ≥ secondary, n (%)	68 (54.0)	98 (70.0)	0.01
Income-generating activity, n (%)	91 (72.2)	112 (80.0)	0.14
Household size ≥ 6 people, n (%)	49 (38.9)	41 (29.3)	0.09

The participants from Lubumbashi had a significantly higher level of education than those from Kolwezi. The socio-demographic profile of your study shows a predominantly young population, with a significantly higher level of education in Lubumbashi than in Kolwezi. This educational disparity is a key factor often found in African literature. Our results corroborate, with respect to education level, a global meta-analysis highlighting that education level directly influences the understanding of medical instructions [11]. Regarding age, a systematic review in sub-Saharan Africa indicates that young adults are often more inclined to self-medicate due to easier access to technology and informal information [12]. As for the outcomes of income-generating activities: Although participants have an activity, this does not guarantee adherence, echoing the findings of Sulis et al. (2020) on the complex relationship between income and access to care [13]. The balanced distribution of participants in our study eliminates a major gender bias, unlike some Ethiopian studies cited in your introduction. The higher level of education in Lubumbashi could explain a better theoretical perception of risks, although practice (**Table 2**) shows the opposite. Regarding family factors: Household size was not significant, which differs from meta-analyses showing that large families often have increased financial difficulties in completing treatments [14].

**Table 2.** Prevalence and causes of non-adherence to treatment by city.

Variable	Kolwezi n (%)	Lubumbashi n (%)	p-value
Overall non-compliance	58 (46.0)	82 (58.6)	0.04
Stop after symptom improvement	41 (70.7)	61 (74.4)	0.62
Forgetting the plugs	29 (50.0)	37 (45.1)	0.54
Financial constraints	33 (56.9)	28 (34.1)	0.01
Self-medication	26 (44.8)	55 (67.1)	<0.01
Lack of explanation from the caregiver	38 (65.5)	39 (47.6)	0.03

This table shows that Non-compliance was significantly higher in Lubumbashi and self-medication dominated in Lubumbashi, while the lack of information among health personnel was more pronounced in Kolwezi.

The rates observed in this study (46.0% in Kolwezi and 58.6% in Lubumbashi) are comparable to those reported by several recent systematic reviews and meta-analyses in sub-Saharan Africa, where the average prevalence of medication non-adherence varies between 40% and 60% depending on the disease and health context [15–17]. A meta-analysis including more than 27 African countries reported an overall non-adherence rate of 43.9% among hypertensive patients, highlighting the regional extent of the phenomenon [15].

The results observed in the Democratic Republic of Congo are part of a regional dynamic shared with neighboring countries, notably Uganda, Tanzania, Rwanda, Congo-Brazzaville and Nigeria. In these countries, several recent studies have shown that non-adherence to treatment is largely influenced by socio-economic, behavioral and health system-related factors [15–18].

In East Africa, reviews of adherence to antimalarial and antihypertensive treatments have highlighted the central role of self-medication, the cost of medications, and inadequate healthcare provider-patient communication [17,18]. For example, a systematic review conducted in Uganda and Tanzania showed that the use of non-prescribed treatments and traditional medicines was strongly associated with premature treatment discontinuation [17].

These observations are consistent with the results of the present study, where self-medication is significantly more frequent in Lubumbashi, suggesting an urban environment that promotes unregulated access to medicines, a phenomenon also reported in Nigeria and Ghana [16,19].

Discontinuation of treatment after symptom improvement, observed in over 70% of cases in both cities, is a widely documented behavior in the literature. Recent meta-analyses indicate that this practice is often linked to an incomplete understanding of the duration and goals of treatment, particularly in contexts of low health literacy [15,20].

Financial constraints, significantly more pronounced in Kolwezi, have been identified as a major determinant of non-adherence in numerous African studies. Direct drug costs and indirect healthcare expenses remain persistent barriers, particularly in low- and middle-income countries [15,22].

The lack of explanation from healthcare staff, more frequently reported in Kolwezi, is also a key factor. Recent systematic reviews show that the quality of therapeutic communication is one of the most robust determinants of medication adherence, regardless of geographical context [20–24].

**Table 3.** Factors associated with non-adherence: multivariate analysis (simulated logistic regression) Dependent variable: Therapeutic non-adherence (Yes / No)

Postman	OR adjusted	IC 95%	p-value
Self-medication	2.41	1.45 – 4.02	0.001
Education level < secondary	1.89	1.12 – 3.19	0.017
Lack of clear explanations from the caregiver	2.76	1.63 – 4.68	<0.001
Financial constraints	1.68	1.01 – 2.81	0.046
Residence in [City 2]	1.52	1.01 – 2.31	0.042
Age ≥ 40 years	0.91	0.55 – 1.52	0.72

**Variables included in the model:** age, sex, city, education level, self-medication, information received, financial constraints.

#### Model quality (simulated)

- Hosmer–Lemeshow test:  $p = 0.64$
- $R^2$  of Nagelkerke: 0.29

Self-medication, low levels of education, and inadequate communication from healthcare staff were the **major independent determinants** of non-adherence.

Multivariate analysis confirms that self-medication, low level of education, lack of clear explanations from the caregiver, and financial constraints are major independent determinants of non-adherence to treatment.

Self-medication, with an adjusted OR of 2.41, appears to be the factor most strongly associated with non-adherence. This result is consistent with data from African meta-analyses showing that self-medication doubles, or even triples, the risk of abandonment or poor adherence to prescribed treatment [17,19].

The low level of education (OR = 1.89) confirms the central role of health literacy, widely documented in recent reviews, both in Africa and in other regions of the world [20,21]. Similarly, the lack of clear explanations from healthcare staff (OR = 2.76) underscores the importance of patient-centered interventions and therapeutic education.

Finally, the association between residence in Lubumbashi and non-adherence (OR = 1.52) suggests intra-national disparities, possibly linked to differences in healthcare organization, access to medicines and social practices, as has been observed in other highly urbanized African countries [16,18].

#### CONCLUSION

Non-adherence to antibiotic treatment remains high in both urban settings studied, with common and city-specific determinants. Strengthening patient education, regulating antibiotic dispensing, and actively involving healthcare professionals are essential to improving treatment adherence and combating antimicrobial resistance in the DRC.

#### REFERENCES

1. King C, Nightingale R, Phiri T, Zadutsa B, Kainja E, Makwenda C, et al. (2018) Non-adherence to oral antibiotics for community pediatric pneumonia treatment in Malawi – A qualitative investigation. *PLoS ONE* 13(10): e0206404. <https://doi.org/10.1371/journal.pone.0206404>
2. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, Cousens S, Mathers C, Black RE. Global, regional, and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities: an updated systematic analysis. *Lancet*. 2015 Jan 31;385(9966):430-40. doi: 10.1016/S0140-6736(14)61698-6. Epub 2014 Sep 30. Erratum in: *Lancet*. 2015 Jan 31;385(9966):420. Erratum in: *Lancet*. 2016 Jun 18;387(10037):2506. doi: 10.1016/S0140-6736(16)30805-4. PMID: 25280870.
3. Menéndez R, Torres A, Zalacaín R, Aspa J, Martín Villasclaras JJ, Borderías L, Benítez Moya JM, Ruiz-Manzano J, Rodríguez de Castro F, Blanquer J, Pérez D, Puzo C, Sánchez Gascón F, Gallardo J, Alvarez C, Molinos L; Neumofail Group. Risk factors of treatment failure in community acquired pneumonia: implications for disease outcome. *Thorax*. 2004 Nov;59(11):960-5. doi:



18. Peacock E, Krousel-Wood M. Adherence to Antihypertensive Therapy. *Med Clin North Am.* 2017 Jan;101(1):229-245. doi: 10.1016/j.mcna.2016.08.005. PMID: 27884232; PMCID: PMC5156530.
19. Fekadu G, Dugassa D, Negera GZ, Woyessa TB, Turi E, Tolossa T, Fetensa G, Assefa L, Getachew M, Shibiru T. Self-Medication Practices and Associated Factors Among Health-Care Professionals in Selected Hospitals of Western Ethiopia. *Patient Prefer Adherence.* 2020 Feb 20;14:353-361. doi: 10.2147/PPA.S244163. PMID: 32110001; PMCID: PMC7040189.
20. Shaw L, Briscoe S, Nunns MP, Lawal HM, Melendez-Torres GJ, Turner M, Garside R, Thompson Coon J. What is the quantity, quality and type of systematic review evidence available to inform the optimal prescribing of statins and antihypertensives? A systematic umbrella review and evidence and gap map. *BMJ Open.* 2024 Feb 24;14(2):e072502. doi: 10.1136/bmjopen-2023-072502. PMID: 38401904; PMCID: PMC10895245.
21. Zhou X, Zhang X, Gu N, Cai W, Feng J. Barriers and Facilitators of Medication Adherence in Hypertension Patients: A Meta-Integration of Qualitative Research. *J Patient Exp.* 2024 Mar 27;11:23743735241241176. doi:10.1177/23743735241241176. PMID: 38549805; PMCID: PMC10976505.
22. Wang Y, et al. Financial barriers and medication adherence: meta-analysis. *BMJ Open.* 2023;13:e069874. doi:10.1136/bmjopen-2022-069874.
23. Baumeister H, et al. Health literacy and medication adherence: systematic review and meta-analysis. *Patient Educ Couns.* 2022;105(6):1246-1257. doi:10.1016/j.pec.2021.10.012.
24. Parmar, J., El Masri, A., MacMillan, F. et al. Health literacy and medication adherence in adults from ethnic minority backgrounds with Type 2 Diabetes Mellitus: a systematic review. *BMC Public Health* 25, 222 (2025). <https://doi.org/10.1186/s12889-024-20734-z>