



Research Article

Age-Related Causes of Admissions and Outcome of Patients in a Medical Ward in Sub-Saharan Africa: A Retrospective Study from a Tertiary Referral Hospital in Cameroon

Profil des admissions et devenir des patients hospitalisés dans un service médecine interne en Afrique subsaharienne : une étude rétrospective dans un hôpital tertiaire au Cameroun

Hamadou Rachidou^{1,2*}, Marie Patrice Halle^{1,2}, Yacouba Njankouo Mapoure^{1,2}, Félicité Kamdem^{1,2}, Anastase Dzudie^{1,3}, Fernando Kemta Lekpa^{1,4}, Bertrand Hugo Mbatchou Ngahane^{1,2}, Henry Namme Luma^{1,3}

ABSTRACT

Affiliations

¹Department of Internal Medicine, Douala General Hospital, Cameroon

²Faculty of Medicine and Pharmaceutical Science, University of Douala, Cameroon

³Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Cameroon

⁴Faculty of Medicine and Pharmaceutical Science, University of Dschang, Cameroon

Corresponding author:

Dr. Hamadou Rachidou, Douala General Hospital, PO Box: 4856 Douala, E-mail:

drracham2010@gmail.com,

ORCID: <https://orcid.org/0000-0002-2383-736X>, Tel: +237 650 44 58 81

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Mots clés : admissions médicales, causes, devenir, Douala, Cameroun.

List of abbreviations

AIDS: Acquired immunodeficiency syndrome; CKD: Chronic kidney disease, COPD: Chronic obstructive pulmonary disease, DGH: Douala General Hospital, HIV: Human immunodeficiency virus, ICD-10: International classification of diseases, NCD: Non-communicable disease.

Background. An accurate description of the pattern of diseases is important in planning and assessing public health policies. Hence, we aimed to determine the causes of admissions and outcome of patients admitted in the medical ward of a tertiary referral hospital in Cameroon. **Methods.** This was a retrospective study conducted in the medical ward of the Douala General Hospital. All patients admitted in the ward between January 2015 and December 2017 were included. Medical files were reviewed and data on sociodemographic characteristics, comorbidities, length of stay, outcome and diagnosis at admission were collected. Diagnoses were grouped in communicable diseases or non-communicable diseases (NCDs) and then classified according to the International Classification of Diseases (ICD-10). **Results.** A total of 4591 patients were admitted among which 94.0% (4316/4591) were included for analyses. The mean age of participants was 52.9 ± 17.2 years, 51.3% (2212/4316) were young and 55.3% (2288/4316) were male. NCDs constituted two thirds of admissions. According to the ICD-10, infectious diseases were the leading causes of admissions accounting for 20.5% (886/4316) of all admissions, followed by cancer and cardiovascular diseases with 19.9% (862/4316) and 19.0% (820/4316) of admissions respectively. Young patients were more likely to be admitted for infectious diseases ($p < 0.001$) while elderly patients were more frequently admitted for cardiovascular diseases ($p < 0.001$). Overall, the median length of stay was 7.0 (4.0-11.0) days and the in-hospital mortality was 17.4%. **Conclusion.** Infectious, cancer and cardiovascular diseases were the leading causes of medical admissions. The double burden of diseases in developing countries may explain this pattern of admissions.

RÉSUMÉ

Introduction. Une description précise du profil des maladies est importante dans la planification et l'évaluation des politiques de santé publique. Par conséquent, nous avons mené cette étude dans le but de déterminer les causes d'admissions et le devenir des patients hospitalisés dans un service de médecine interne au Cameroun. **Méthodes.** Il s'agit d'une étude rétrospective menée dans le service de médecine interne de l'Hôpital Général de Douala. Tous les patients admis dans le service entre janvier 2015 et décembre 2017 ont été inclus. Les dossiers médicaux ont été examinés et des données sur les caractéristiques sociodémographiques, les comorbidités, la durée d'hospitalisation, le devenir des patients et le diagnostic à l'admission ont été recueillies. Les diagnostics ont été regroupés en maladies transmissibles ou maladies non transmissibles (MNT) puis classés selon la Classification Internationale des Maladies (CIM-10). **Résultats.** Au total, 4591 patients ont été admis parmi lesquels 94,0% (4316/4591) ont été inclus pour analyses. L'âge moyen des participants était de $52,9 \pm 17,2$ ans, avec 51,3 % (2212/4316) jeunes et 55,3 % (2288/4316) hommes. Les MNT représentaient les deux tiers des admissions. Selon la CIM-10, les maladies infectieuses étaient les principales causes d'admissions représentant 20,5 % (886/4316) de toutes les admissions, suivies du cancer et des maladies cardiovasculaires avec 19,9 % (862/4316) et 19,0 % (820/4316) d'admissions respectivement. Les jeunes patients étaient plus susceptibles d'être admis pour des maladies infectieuses ($p < 0,001$) tandis que les patients âgés étaient plus fréquemment admis pour des maladies cardiovasculaires ($p < 0,001$). Dans l'ensemble, la durée médiane de séjour était de 7,0 (4,0-11,0) jours et la mortalité hospitalière était de 17,4 %. **Conclusion.** Les maladies infectieuses, le cancer et les maladies cardiovasculaires étaient les principales causes d'admissions médicales. Le double fardeau des maladies dans les pays en développement peut expliquer ce profil d'admissions.

HIGHLIGHTS OF THE STUDY**What is already known on this topic**

An accurate description of the pattern of diseases is important in planning and assessing public health policies. Developing countries are facing a double burden of communicable diseases and non-communicable diseases (NCDs).

What question this study addressed

Causes of medical admissions and outcome of patients admitted in a tertiary hospital in Cameroon.

What this study adds to our knowledge

Infectious, cancer and cardiovascular diseases were the leading causes of medical admissions. Young patients were more likely to be admitted for infectious diseases while elderly patients were more frequently admitted for cardiovascular diseases. Overall, the in-hospital mortality was 17.4%.

How this is relevant to practice, policy or further research

With the growing ageing of the population, there is a need to establish more public health policies to prevent NCDs

studies from African countries showed that communicable diseases are leading causes of medical admissions, closely followed by NCDs such as cardiovascular, respiratory, and gastrointestinal diseases [11-15].

In Cameroon, communicable diseases and NCDs represented 40.7% and 14.2% of the burden of disease respectively; with HIV-related diseases, malaria, lower respiratory infections, diarrheal and cardiovascular diseases being more prevalent [16]. There is paucity of data on medical admissions in Cameroon; most of the available studies reported admissions on only few groups of diseases or patients [17-19]. Nevertheless, Pancha et al. reported in a study in 2015 that malaria, diarrheal and HIV-related diseases were the main causes of medical admissions in a secondary hospital in the northern part of Cameroon [20]. However, this study lacked use of a universally accepted classification of diseases and it did not report the causes of admissions according to age. Hence, the aim of our study was to determine the age-related causes of admissions and outcome of patients in the medical ward of a tertiary referral hospital in Cameroon.

INTRODUCTION

Over the past seven decades, the world has experienced significant demographic changes [1]. According to the 2019 population estimates, life expectancy increased from 47 years in 1950 to 71 years in 2015 [2]. As populations aged, a long-term shift occurred in the burden of diseases from communicable to non-communicable diseases (NCDs) [1]. Of the 55 million deaths recorded worldwide in 2016, 40 million (72.3%) were due to NCDs, principally cardiovascular diseases, cancer, chronic obstructive pulmonary disease (COPD) and diabetes mellitus [3]. Nearly 80% of these deaths occurred in developing countries [4]. While the annual number of deaths due to communicable diseases is projected to decline, those due to NCDs deaths is projected to increase to 61 million by 2040 [3].

As this epidemiological transition occurs, it is important to understand variations in the pattern of disease. An accurate description of the causes of morbidity and mortality is crucial to establish public health policies [5,6]. Although data on hospital admissions are not helpful to estimate the true incidence of diseases, it provides relevant information on the burden of disease, the use of healthcare facilities and the quality of hospital care [7,8]. In a population-based worldwide cohort study in 2019, 23.6% of participants were admitted to hospitals and the leading causes of medical admissions were cardiovascular diseases followed by gastrointestinal, cancer and respiratory diseases [5]. At country level, the same pattern of diseases is observed in developed countries where NCDs are predominant [9]. This has been supported by a report from France in 2020 where the leading causes of medical admissions were gastrointestinal, cardiovascular and cancer diseases [10]. Conversely, developing countries, are facing a double burden of communicable diseases and NCDs [9]. Various

METHODS**Study design and setting**

We carried out a retrospective study over a three-year period (January 1, 2015 to December 31, 2017) in the medical ward of the Douala General Hospital (DGH), a tertiary referral hospital situated in the Littoral region of Cameroon. This hospital, with a capacity of 320 beds, has several wards including medical, surgical, obstetrics, gynecology and pediatric wards. At the time of the study, there were 29 physicians in the medical ward, distributed as follows: 4 general practitioners, oncologists, and neurologists; 3 cardiologists, rheumatologists and gastroenterologists; 2 nephrologists and endocrinologists and one hematologist, dermatologist, chest physician and infectious disease specialist. All patients are admitted through either the emergency department or the outpatient unit. During the course of their admission, patients clinical and paraclinical data are reported in open medical files upon admission. At discharge, these files are recorded and stored in the archives.

Patients and data collection

This study was based on the medical files of all patients admitted in the medical ward of the DGH during the study period. We excluded all medical files with missing relevant data on the diagnosis and outcome of patients. Data collected were sociodemographic characteristics (age, sex, residence, marital status, employment status, health insurance), comorbidities, length of stay, outcome (discharge, death, left against medical advice, referral) and diagnosis at admission. Diagnoses were grouped in communicable diseases or NCDs and then classified according to the International Classification of Diseases, 10th edition (ICD-10) [21].

Definition of operational terms

Communicable diseases were defined as diseases presenting with fever and/or abnormal white blood cells count ($> 12000/\text{mm}^3$ or $< 4000/\text{mm}^3$) and due to a clinically suspected and/or biologically proven invasion by a pathogenic microorganism. Non-communicable diseases were defined as diseases of long duration, generally of slow progression and not directly associated to the pathogenic effects of a microorganisms. Young patients were those aged less than 55 years and elderly patients were those aged 55 years or above.

Statistical analysis

We used SPSS version 23.0 for Windows (IBM Corp., Armonk, New York) software for statistical analysis. A comparison was done according to age of patients. Qualitative data were described as frequencies and

percentages and compared with Chi-square test (χ^2) or Fisher's exact test. Quantitative variables were reported medians and interquartile ranges (IQR) and their comparisons were done Mann Whitney's test. In-hospital mortality was calculated by dividing the number of deceased patients by the number of total admissions. A difference was considered statistically significant when p-value was less than 0.05.

Ethics approval and consent to participate

This study received the administrative authorization of the DGH and the ethical clearance of the Institutional Ethics Committee of the University of Douala, with reference number 1222CEI-Udo/01/2018/T. The study used clinical files, and therefore no opportunity of consenting participants individually.

RESULTS

Baseline characteristics of the study population

During the study period, 4591 patients were admitted in the medical ward of the DGH among which 94.0% (4316/4591) were included for analysis. Their baseline characteristics are summarized in table 1.

Variables	Overall	< 55 years	≥ 55 years	p-value
Total, n (%)	4316 (100)	2212 (51.3)	2104 (48.7)	-
Male, n (%)	2288 (53.0)	1201 (54.3)	1087 (51.7)	0.083
Urbanization, n (%)	3948 (91.5)	2030 (91.8)	1918 (91.2)	0.471
Married, n (%)	2709 (62.8)	1297 (58.6)	1412 (67.1)	< 0.001
Employment status, n (%)				
Employed	2186 (50.6)	1482 (67.0)	704 (33.5)	< 0.001
Unemployed or retired	1847 (42.8)	448 (20.3)	1399 (66.5)	< 0.001
Student	283 (6.6)	283 (12.8)	0 (0.0)	< 0.001
Insured, n (%)	3320 (76.9)	1492 (64.5)	1828 (86.9)	< 0.001
Comorbidities[‡], n (%)				
Hypertension	1778 (41.2)	537 (24.3)	1241 (59.0)	< 0.001
Cancer	956 (22.2)	469 (21.2)	487 (23.1)	0.124
Diabetes mellitus	813 (18.8)	208 (9.4)	605 (28.8)	< 0.001
HIV/AIDS	676 (15.7)	534 (24.1)	142 (6.7)	< 0.001
Stroke	582 (13.5)	150 (6.8)	432 (20.5)	< 0.001
Chronic kidney disease	531 (12.3)	255 (11.5)	276 (13.1)	0.112
Heart failure	314 (7.3)	83 (3.8)	231 (11.0)	< 0.001
Hepatitis B or C	312 (7.2)	128 (5.8)	187 (8.7)	< 0.001
Gastric and duodenal ulcers	192 (4.4)	82 (3.7)	110 (5.2)	0.015
Liver cirrhosis	167 (3.9)	58 (2.6)	109 (5.2)	< 0.001
Asthma	31 (0.7)	16 (0.7)	15 (0.7)	0.968
COPD	30 (0.7)	5 (0.2)	25 (1.2)	< 0.001
Other comorbidities [*]	637 (14.8)	250 (11.3)	387 (18.4)	< 0.001

AIDS Acquired immunodeficiency syndrome; COPD Chronic obstructive pulmonary disease; HIV Human immunodeficiency virus; [‡]Patients could have more than one comorbidity; ^{*}Other comorbidities were atrial fibrillation, cardiomyopathy, gout, chronic headaches, dementia, epilepsy, hyperplasia of prostate, lumbar disc disorders, Parkinson's disease, systemic lupus erythematosus.

Age ranged from 15 to 101 years with a mean age of 52.9 ± 17.2 years and 51.3% (2212/4316) were young. Overall, 55.3% (2288/4316) of patients were male, 91.5% (3948/4316) lived in urban areas, 62.8% (2706/4316) were married, 50.6% (2186/4316) were employed and 76.9% (3320/4316) were insured. Young patients were significantly more employed ($p < 0.001$) while elderly patients were significantly more married ($p < 0.001$), insured ($p < 0.001$), unemployed or retired ($p < 0.001$). Hypertension, cancer and diabetes were the main comorbidities with 41.2% (1778/4316), 22.2% (956/4316), 18.8% (813/4316) of all admissions respectively. Hypertension and diabetes were more prevalent in elderly patients ($p < 0.001$ each).

Causes of admissions and outcome of patients

As presented in fig. 1, NCDs accounted for 68.6% (2960/4316) of all admissions compared to 31.4% (1356/4316) for communicable diseases. Although NCDs predominated in both ages, there was a higher proportion of patients with NCDs in elderly patients ($p < 0.001$).

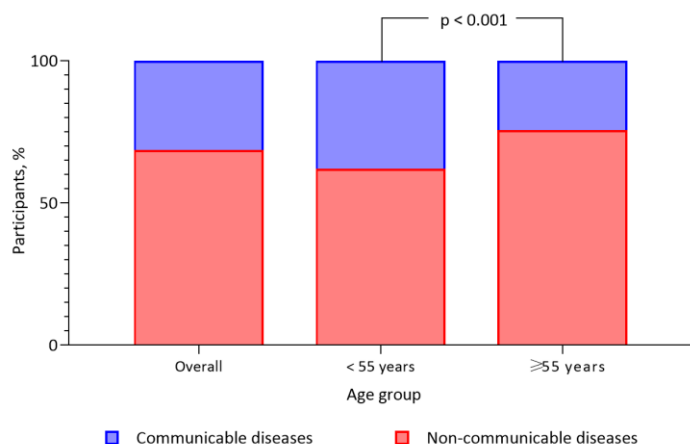


Fig. 1 Communicable diseases and non-communicable diseases amongst admitted patients

Table 2 shows the causes of admissions according to the ICD-10. Overall, infectious diseases including pneumonia, tuberculosis and HIV-related diseases were first, accounting for 20.5% (886/4316) of all admissions; followed by cancer and cardiovascular (such as stroke and heart failure) diseases with 19.9% (862/4316) and 19.0% (820/4316) of admissions respectively. Young patients were more likely to be admitted for infectious diseases ($p < 0.001$) while elderly patients were more frequently admitted for cardiovascular diseases ($p < 0.001$).

Variables	Overall	< 55 years	≥ 55 years	p-value
Category of diseases (ICD-10 code), n (%)				
Infectious diseases (A00-B99)	886 (20.5)	612 (27.7)	274 (13.0)	< 0.001
Cancer diseases (C00-D48)	862 (19.9)	439 (19.8)	423 (20.1)	0.832
Cardiovascular diseases (I00-I99)	820 (19.0)	252 (11.4)	568 (27.0)	< 0.001
Genitourinary diseases (N00-N99)	428 (9.9)	229 (10.4)	199 (9.5)	0.326
Respiratory diseases (J00-J99)	295 (6.8)	130 (5.9)	165 (7.8)	0.011
Digestive diseases (K00-K93)	294 (6.8)	135 (6.1)	159 (7.6)	0.058
Endocrine diseases (E00-E90)	246 (5.7)	92 (4.2)	154 (7.3)	< 0.001
Neurological diseases (G00-G99)	161 (3.7)	97 (4.4)	64 (3.0)	0.020
Hematological diseases (D50-D89)	108 (2.5)	90 (4.1)	18 (0.9)	< 0.001
Musculoskeletal diseases (M00-M99)	106 (2.5)	60 (2.7)	46 (2.2)	0.264
Mental diseases (F00-F99)	32 (0.7)	22 (1.0)	10 (0.5)	0.047
Skin diseases (L00-L99)	18 (0.4)	15 (0.7)	3 (0.1)	0.006
Other diseases [†]	60 (1.4)	39 (1.8)	21 (1.0)	0.032
Main diseases (ICD-10 code), n (%)				
Stroke (I60-I63)	442 (10.2)	124 (5.6)	318 (15.1)	< 0.001
Chronic kidney disease (N18)	262 (6.1)	139 (6.3)	123 (5.8)	0.547
Pneumonia (J15)	255 (5.9)	110 (5.0)	145 (6.9)	0.008
Tuberculosis (A15-A19)	235 (5.4)	185 (8.4)	50 (2.4)	< 0.001
Diabetes mellitus (E10-E14)	227 (5.3)	82 (3.7)	145 (6.9)	< 0.001
Heart failure (I50)	219 (5.1)	58 (2.6)	161 (7.7)	< 0.001
HIV-related diseases (B20-B24)	211 (4.9)	179 (8.1)	32 (1.5)	< 0.001
Diarrheal diseases (A00-A09)	172 (4.0)	85 (3.8)	87 (4.1)	0.624
Malaria (B50)	124 (2.9)	87 (3.9)	37 (1.8)	< 0.001
Breast cancer (C50)	119 (2.8)	81 (3.7)	38 (1.8)	< 0.001
Urinary tracts infection (N39)	118 (2.7)	51 (2.3)	67 (3.2)	0.077
Septicemia (A41)	96 (2.2)	50 (2.3)	46 (2.2)	0.869

ICD-10 International classification of diseases; HIV Human immunodeficiency virus; [†]Other diseases were diseases of the ear (H60-H95), puerperium diseases (O00-O99), symptoms and signs not elsewhere classified (R00-R99), injury and poisoning (S00-T98).

The median length of stay was 7.0 (4.0-11.0) days and 38.5% (1662/4316) patients were admitted for 1 to 6 days with no difference according to age ($p = 0.812$). A total of 77.2% (3331/4316) patients were discharged, 17.4% (749/4316) died during admission and 4.4% (188/4316) left against medical advice. There was no difference in term of discharge ($p = 0.603$) or in-hospital mortality ($p = 0.427$) while those who left against medical advice were more young patients ($p = 0.029$) (Table 3).

Table 3 Length of stay and outcome of admitted patients

Variables	Overall	< 55 years	≥ 55 years	p-value
Length of stay (days), median (IQR)	7.0 (4.0-11.0)	7.0 (4.0-11.0)	7.0 (4.0-11.0)	0.279
Length of stay (days), n (%)				
1-6	1662 (38.5)	848 (38.3)	814 (38.7)	0.812
6-11	1540 (35.7)	774 (35.0)	766 (36.4)	0.332
11-16	574 (13.3)	290 (13.1)	284 (13.5)	0.708
16-21	261 (6.0)	145 (6.6)	116 (5.5)	0.151
≥ 21	279 (6.5)	155 (7.0)	124 (5.9)	0.137
Outcome, n (%)				
Discharge	3331 (77.2)	1700 (76.9)	1631 (77.5)	0.603
Death	749 (17.4)	374 (16.9)	375 (17.8)	0.427
Left against medical advice	188 (4.4)	111 (5.0)	77 (3.7)	0.029
Referral	48 (1.1)	27 (1.2)	21 (1.0)	0.486

DISCUSSION

To the limits of our knowledge, this study describes for the first time the age-related causes of admissions and outcome of patients in a medical ward of the main tertiary referral hospital in Cameroon. The results show that patients were mainly young and male. Hypertension, cancer and diabetes were the main comorbidities with hypertension and diabetes being more prevalent in elderly patients. NCDs predominated in both ages and were significantly more frequent in elderly patients. According to the ICD-10, the leading causes of admissions were infectious, cancer and cardiovascular diseases. Young patients were more likely to be admitted for infectious diseases while cardiovascular diseases were more frequent in elderly patients. The median length of stay was 7.0 (4.0-11.0) days and the in-hospital mortality was 17.4% with no difference according to age.

Our study population was predominantly young and male, this is in agreement with the demographic data of the Littoral region [22]. However, we noted a higher proportion of elderly patients in our series compared to the general population. Similar observations have been reported by other authors [15,23-25]. Hypertension, cancer and diabetes mellitus were the main comorbidities with hypertension and diabetes being more prevalent in elderly patients. This highlights the role of ageing in cardiovascular diseases and diabetes [26].

In our study, NCDs were predominant and accounted for two thirds of admissions. This finding is in consonance with previous studies in other tertiary referral hospitals in Africa such as Uganda (62.0%) [27], Nigeria (64.6%) [24] and Sudan (71.8%) [15]. In contrast, Allain et al. found a lower proportion of NCDs (29.9%) in Malawi [28]. When presented according to the ICD-10, infectious came up top, followed by cancer and cardiovascular diseases. Young patients were more likely to be admitted for infectious diseases while elderly patients were more frequently admitted for cardiovascular diseases. This finding is in agreement with similar studies on hospital admissions. A systematic review from Africa found that the leading causes of medical admissions were infectious, respiratory and cardiovascular diseases, with a 16% increase in admissions for cardiovascular diseases in 60 years [11]. This is indicative of the double burden of communicable diseases and NCDs in developing

countries [29,30]. According to the WHO estimates, there are more deaths from communicable diseases than NCDs. However, the prevalence of NCDs is rising rapidly and is projected to overtake communicable diseases and cause almost three quarters of deaths [4,31]. The most cited determinants of this epidemiological transition are populations ageing, growing urbanization, and changes in behavioral and dietary habits [26,32-34].

The median length of stay was 7 (4.0-11.0) days, in accordance with previous observations [14,24,35-37]. The in-hospital mortality of 17.4% is similar to most rates reported in other developing countries [14,24,35], but higher than those reported in developed countries [38,39]. This high figure could be attributed to the late presentation of patients as reported by studies in that tertiary referral hospital that is at the top of the health pyramid of Cameroon [40-43].

Strengths and limitations

The limitations of the present study are those inherent to retrospective studies, such as missing data. Also, data were collected from a single hospital, which could raise issues of its application to the entire country. However, the DGH is one of the two tertiary referral hospital in Cameroon and patients admitted there come from all over the country. This study has as major strength that it describes for the first time the age-related causes of medical admissions and outcome of patients in a tertiary referral hospital in Cameroon. This could help to establish public health policies to improve the care of this group of patients.

CONCLUSION

This study found a higher proportion of young patients among medical admissions in DGH. NCDs constituted two thirds of admissions, predominantly among the elderly patients. Infectious diseases were the leading causes of admissions, followed by cancer and cardiovascular diseases; with infectious diseases more frequent in young patients and cardiovascular diseases more frequent in elderly patients. This highlights the double burden of diseases in developing countries. With the growing ageing of the population, there is a need to establish more public health policies to prevent noncommunicable diseases.

DECLARATIONS

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

HR: Study design, Data collection, analysis and interpretation, Manuscript drafting. **MPH:** Study conception and design, Supervision of data collection, Critical revision of the manuscript. **YNM:** Data analysis and interpretation, Critical revision of the manuscript. **FK:** Data collection, Critical revision of manuscript. **AD:** Supervision of data collection, Critical revision of the manuscript. **FKL:** Supervision of data collection, Critical revision of the manuscript. **BHMN:** Supervision of data analysis, Critical revision of the manuscript. **HNL:** Study conception, Critical revision of the manuscript. All authors have read and approve of the final manuscript.

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