



A Descriptive Study of Medicine Utilisation in Côte D'Ivoire



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Highlights

- Medicine utilization in Côte d'Ivoire increased significantly from 2014 to 2018, with overall consumption rising by 28.89% and the prevalence of use increasing from 17.98% to 20.87%.
- The most utilized medicines were for the cardiovascular system, anti-infectives for systemic use, and the alimentary tract, with systemic antibacterials being the single most prescribed therapeutic group.
- A concerning finding was the high consumption of systemic antibacterials, which, alongside the overall growth in medicine use, highlights the need for studies on the rationality of drug use to inform health policy.

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ABSTRACT

Background: The measurement of medicine utilisation is of considerable benefit for policymakers in the planning and assessment of medicine policies. This study aimed to describe the temporal trends and utilisation patterns of medicines in Côte d'Ivoire.

Methods: We conducted a retrospective description of medicine utilisation at the MUGEFCI. Main subscribers and beneficiaries aged 15 and over who used at least one drug reimbursed between 1st January 2014 and 31st December 2018 were included. Data were retrieved from the MUGEFCI database and described via the Anatomical Therapeutic Chemical/Defined Daily Dose (ATC/DDD) methodology. The results were expressed as defined daily doses per 1,000 insureds per day (DID). The prevalence and incidence of medicine utilisation were calculated.

Results: Between 2014 and 2018, the overall prevalence of use increased from 17.98% (95% CI: 17.90% - 18.05%) to 20.87% (95% CI: 20.80% - 20.94%). There was an 18.96% decrease in the incidence of use, from 6.11% (95% CI: 6.06% - 6.15%) to 4.90% (95% CI: 4.91% - 4.99%). Total medicine utilisation increased from 169.60 DID in 2014 to 218.61 DID in 2018. Each year, the medicines with the highest rate of utilisation were those for the cardiovascular system (C), anti-infectives for systemic use (J) and alimentary tract and metabolism (A). Approximately 50% of the medicine used belong to four therapeutic groups: antibacterials for systemic use (J01), agents acting on the renin-angiotensin system (C09), calcium channel blockers (C08), and drugs used in diabetes (A10).

Conclusion: Medicine utilisation has shown an increasing trend. A study of the factors that explain this growth can provide decision-makers with arguments for ensuring that they are used rationally.

Keywords: Medicine utilisation, ATC/DDD methodology, Africa, Mutual Insurance Company, Retrospective analysis



Introduction

Medicines are of paramount importance for the maintenance and rehabilitation of good health [1]. Their judicious utilisation has been demonstrated to alleviate the symptoms of disease and promote the restoration of health. It is therefore evident that they are accorded a high priority within healthcare systems on a global scale [2].

In a multitude of countries, the consumption and expenditure of medicine are increasing on a consistent basis [3;4]. A comprehensive understanding of the temporal and qualitative patterns of medicine utilisation must be developed to assess the rationality of drug use, improve pharmacotherapy and formulate sustainable health policies. However, the consumption of prescribed medications may be influenced by a number of factors, including epidemiological and demographic factors, changes in medical practices, the dynamics of the pharmaceutical market and public policies on medicines [5-7]. Drug utilisation patterns may therefore differ from one geographical region to another depending on these factors. The majority of research on drug utilisation has been conducted in developed countries [8 ; 9]. The focus of this research is on specific drug classes or age groups, frequently the elderly population [9-13]. This is due to demographic shifts, characterised by increasing longevity and ageing populations. The most frequently employed medicines in these countries are those intended for the treatment of chronic, noncontagious diseases [14 ;15].

In African countries, the study of drug consumption profiles remains an underresearched field. The African continent is distinguished by a youthful population that is undergoing rapid expansion. Furthermore, an increase in the rate of urbanisation has been observed on the African continent [16;17].

A number of studies have been conducted on the basis of aggregated data extracted from medico-administrative databases [8;18;19]. Many other cases have been documented in hospital settings, with a reduced sample size, which makes their results unrepresentative of the populations in which they were carried out [20-22]. Nevertheless, the utilisation of When they are sick, MUGEFCI adherents and beneficiaries visit doctors in the country's public

routinely collected data on medications has emerged as a pivotal approach in the field of drug utilisation research [23]. However, in many African countries, there is a notable lack of drug consumption analysis at the individual level, which makes it easier to estimate the frequency (prevalence or incidence) of drug use and to study drug use over a given period of time. In addition, these data make it possible to study drug consumption globally (taking into account all ATC drug groups) without focusing on a single ATC group. The present paper constitutes an analysis of drug utilisation, with the focus being on an individual-level data analysis of prescription drugs from Côte d'Ivoire. This study uses data from the oldest and largest mutual health insurance companies in the country. The aim of this study was to describe the temporal trends and utilisation patterns of medicines in Côte d'Ivoire.

Methods

In this study, the terms 'medicine utilisation', 'medicine consumption', 'pharmaceutical utilisation' and 'pharmaceutical consumption' are used interchangeably.

Study Design and Data Source

We conducted a retrospective analysis of drug consumption patterns among adherents and beneficiaries of the Mutual Insurance Company for civil servants and agents of the State of Côte d'Ivoire (MUGEFCI). Côte d'Ivoire is a West African country that is classified by the World Bank as a low- to middle-income country. The MUGEFCI provides social health insurance coverage for active and retired civil servants, government employees and their dependents. Three subscription schemes are available:

- the "basic regime", now known as the "basic supplementary scheme": in addition to dental and optical care, adherents and beneficiaries of the basic regime had 70% of their drug costs covered by the MUGEFCI;
- the "Ivoir'Santé" scheme: adhérents and beneficiaries under this scheme had their outpatient and hospitalisation expenses covered by MUGEFCI;
- the "basic regime + Ivoir'santé", for those who combined the two abovementioned schemes

and private health facilities. These facilities are organised in a pyramid in 3 levels: level 1 (first

contact health establishments), level 2 (regional hospitals) and level 3 (university hospital centres and specialised institutes) for the public sector, alongside which there are private clinics. In each of these structures, patients' prescriptions are passed on to approved doctors, who validate them in accordance with a predefined list of reimbursable medicines before they are dispensed in private pharmacies.

Study population

The study population comprised MUGEFCI adherents and beneficiaries. The participants included in the study were individuals aged 15 years and over who had used at least one drug prescribed by a medical doctor and who was reimbursed by the MUGEFCI over the period of 2014-2018; all the regimes included. Individuals with incomplete data on nature (in terms of international nonproprietary names) and the number of medicines used were excluded from the study. The assumption was that a medicine had been used if it had been prescribed by a physician and dispensed in a pharmacy.

Data analysis

- Trends in the prevalence and incidence of drug use and relative changes from 2014-2018

$$RC = \frac{[\text{Value in 2018} - \text{Value in 2014 (or Value in 2015, for the incidence of use)}] \times 100}{\text{Value in 2014 (or Value in 2015, for the incidence of use)}}$$

Patterns of use from 2014-2018

Medicine utilisation was calculated via the internationally recognised Anatomical Therapeutic Chemical/Defined Daily Dose (ATC/DDD) methodology. The ATC system is a comprehensive classification system that categorises medicines into different groups according to the organ or system on which they act and their chemical, pharmacological and therapeutic properties. Medicines were classified into ATC groups according to their international nonproprietary value. Utilisation was expressed as the DDD per thousand insured persons (DID) with the following formula:

$$DID = [N \times M \times Q] \times 1000 / EP \times DDD \times D$$

N = dispensed prescriptions

M = mass of dose

Q = quantity of pack size

EP = Exposed population = Total number of adherents and beneficiaries who used at least one medicine reimbursed by the MUGEFCI

Two main parameters were calculated: annual incidence and annual incidence of drug use:

- The annual prevalence of drug use was calculated by dividing the number of adherents and beneficiaries with at least one drug reimbursement during a given calendar year by the total number of adherents and beneficiaries present in the MUGEFCI database during the studied year.

- The annual incidence of drug use was calculated by dividing the number of new users during a given calendar year by the total number of adherents and beneficiaries present in the MUGEFCI database during the studied year.

The overall prevalence and incidence of use were calculated, with their 2-sided binomial 95% confidence intervals. They were also stratified by sociodemographic characteristics (sex, age group, status, type of subscription, and area of residence), drug characteristics (first-level ATC group) and healthcare facility characteristics (level 1, level 2 and level 3). The relative change (RC) from 2014-2018 was calculated via the following formula:

DDD = Daily dose assigned by the WHO according to each ATC code and route of administration

D = Duration = 365 days

DDD is assumed to be the average maintenance dose per day for a drug used for its main indication in adults. This technical unit of measurement of drug utilisation does not necessarily reflect the recommended doses used.

Data were acquired from the MUGEFCI database via Excel spreadsheets and analysed via RStudio and Excel 2019 software. Medicine utilisation was estimated for each anatomical group, the top 20 therapeutic groups and each age group over the years

Result and Discussion

Prevalence of drug use

In 2014, 190,416 members and beneficiaries took at least one drug reimbursed by the MUGEFCI. The median age was 42 years, with an

interquartile range of 20 years. In 2018, the number of people who had taken at least one drug rose to 265259. The median age was 42 years, with an interquartile range of 19.

Between 2014 and 2018, the overall prevalence of use rose from 17.98% (95% CI: 17.90% - 18.05%) to 20.87% (95% CI: 20.80% - 20.94%), an increase of 16.10%. This increase was not linear; after an increase in 2015, there was a decrease between 2016, followed by an increase from 2017 onwards (Figure 1). The

increase in prevalence affected mutualists of both sexes and all age groups except the 25–35 year age group. The greatest increases were observed in those older than 65 s. The prevalence of use was also high in health regions other than Abidjan, in private clinics and in all ATC groups of drugs. Among these drugs, anticancer drugs (ATC code: L) showed the greatest increase in prevalence (61.37%). Ivoir'santé subscribers reported a decrease in the prevalence of use of 83.19% (Table 1).

Table 1: Prevalence and incidence of medicine use from 2014-2018

	PREVALENCE OF MEDICINE USE			INCIDENCE OF MEDICINE USE		
	2014	2018	RC	2015	2018	RC
	N= 1059177	N=1270848		N=1131075	N=1270848	
	P (IC95%)	P (IC95%)	(%)	I (IC95%)	I (IC95%)	(%)
Sociodemographic characteristics						
Sex						
- Male	10.23 (10.17 - 10.29)	11.65 (11.59 - 11.71)	+13.88	3.68 (3.64 - 3.71)	2.85 (2.82 - 2.88)	-22.53
- Female	7.75 (7.70 - 7.80)	9.22 (9.17 - 9.27)	+19.04	2.43 (2.40 - 2.46)	2.10 (2.07 - 2.12)	-13.55
Age						
- [15,25]	2.89 (2.85 - 2.92)	3.24 (3.21 - 3.27)	+12.21	1.22 (1.20 - 1.25)	1.09 (1.07 - 1.11)	-11.02
- [25,35]	3.49 (3.46 - 3.53)	3.25 (3.21 - 3.28)	-7.12	1.35 (1.33 - 1.37)	1.06 (1.04 - 1.08)	-21.31
- [35,45]	5.27 (5.22 - 5.31)	6.95 (6.91 - 6.99)	+31.98	1.76 (1.74 - 1.79)	1.53 (1.51 - 1.55)	-13.00
- [45,55]	3.32 (3.29 -3.36)	3.65 (3.62 - 3.69)	+9.97	0.91 (0.89 - 0.92)	0.64 (0.63 - 0.66)	-28.91
- [55,65]	2.13 (2.10 - 2.16)	2.57 (2.54 - 2.60)	+20.58	0.63 (0.62- 0.65)	0.44 (0.43 - 0.45)	-30.7
- [65,75]	0.69 (0.67 - 0.71)	0.91 (0.88 - 0.93)	+32.35	0.18 (0.17 - 0.19)	0.14 (0.13 - 0.15)	-22.57
- ≥75	0.19 (0.17 - 0.21)	0.30 (0.29 - 0.31)	+60.48	0.04 (0.03 - 0.05)	0.04 (0.03 - 0.04)	-17.00
Status						
- Main subscriber	11.97 (11.91 - 12.03)	13.76 (13.70 - 13.82)	+14.96	3.83 (3.80 - 3.87)	2.96 (2.93 - 2.99)	-22.78
- Entitled beneficiary	6.01 (5.96 - 6.05)	7.11 (7.06 - 7.16)	+18.39	2.27 (2.25 - 2.30)	1.99 (1.96 - 2.01)	-12.52
Type of subscription						
- Basic Regime (RB)	12.65 (12.59 - 12.71)	14.83 (14.77 - 14.89)	+17.24	4.64 (4.60 - 4.68)	3.98 (3.94 - 4.01)	-14.28
- Ivoir’Santé (IS)	0.56 (0.54- 0.57)	0.09 (0.08 - 0.10)	-83.19	0.15 (0.14 - 0.16)	0.02 (0.01 - 0.02)	-86.67
- RB + IS	4.77 (4.73 - 4.81)	5.95 (5.91 - 5.99)	+24.74	1.32 (1.30 - 1.34)	0.95 (0.93 - 0.97)	-27.79
Residence						

- Abidjan and around	10.66 (10.60 - 10.72)	11.14 (11.09 - 11.20)	+4.57	2.88 (2.85 - 2.91)	2.39 (2.36 - 2.42)	-16.96
- Other regions	7.32 (7.27 - 7.37)	9.73 (9.68 - 9.78)	+32.88	3.22 (3.19 - 3.26)	2.56 (2.53 - 2.58)	-20.74
Medicine characteristics (ATC groups)						
- A	6.92 (6.88 - 6.97)	9.22 (9.17 - 9.27)	+33.14	2.0 (1.98 - 2.03)	1.65 (1.63 - 1.67)	-17.67
- B	6.06 (6.01 - 6.11)	8.30 (8.26 - 8.35)	+37.02	1.61 (1.58 - 1.63)	1.59 (1.57 - 1.61)	-1.22
- C	2.82 (2.79 - 2.85)	3.37 (3.34 - 3.41)	+19.6	0.57 (0.56 - 0.59)	0.35 (0.34 - 0.36)	-38.5
- D	4.32 (4.28 - 4.36)	5.99 (5.95 - 6.03)	+38.69	1.17 (1.15 - 1.19)	1.06 (1.04 - 1.07)	-9.59
- G	2.10 (2.07 - 2.12)	2.75 (2.72 - 2.77)	+30.95	0.56 (0.55 - 0.58)	0.50 (0.49 - 0.51)	-11.08
- H	2.38 (2.35 - 2.41)	2.74 (2.71 - 2.76)	+14.79	0.63 (0.61 - 0.64)	0.44 (0.43 - 0.45)	-30.00
- J	12.65 (12.58 - 12.71)	15.41 (15.34 - 15.47)	+21.80	4.02 (3.98 - 4.05)	3.33 (3.30 - 3.36)	-17.14
- L	0.04 (0.03 - 0.04)	0.06 (0.05 - 0.06)	+61.37	0.01 (0.01 - 0.02)	0.00 (0.00 - 0.01)	-25.43
- M	8.1 (8.04 - 8.15)	9.85 (9.80 - 9.90)	+21.67	2.26 (2.23 - 2.29)	1.77 (1.74 - 1.79)	-21.81
- N	12.01 (11.95 - 12.07)	14.86 (14.80 - 14.92)	+23.73	3.71 (3.68 - 3.75)	3.07 (3.04 - 3.10)	-17.33
- P	12.55 (12.48 - 12.61)	14.09 (14.03 - 14.51)	+12.32	3.89 (3.85 - 3.93)	2.94 (2.91 - 2.97)	-24.35
- R	7.60 (7.55 - 7.65)	9.21 (9.16 - 9.26)	+21.19	2.04 (2.01 - 2.07)	1.62 (1.60 - 1.65)	-20.33
- S	3.79 (3.76 - 3.83)	4.67 (4.63 - 4.70)	+23.02	0.90 (0.88 - 0.92)	0.70 (0.68 - 0.71)	-22.39
- V	0.01 (0.00 - 0.01)	0.01 (0.01 - 0.02)	+28.10	0.01 (0.01 - 0.02)	0.01 (0.00 - 0.02)	-58.55
Healthcare facilities characteristics						
- level 1	9.52 (9.47 - 9.58)	11.44 (11.39 - 11.50)	+20.18	2.97 (2.94 - 3.00)	2.43 (2.41 - 2.46)	-18.02
- level 2	9.36 (9.30 - 9.42)	10.83 (10.77 - 10.88)	+15.69	3.11 (3.08 - 3.14)	2.33 (2.30 - 2.36)	-25.12
- level 3	1.98 (1.95 - 2.00)	2.24 (2.21 - 2.26)	+13.10	0.39 (0.38 - 0.40)	0.35 (0.34 - 0.36)	-9.61
- private	4.07 (4.03 - 4.11)	6.64 (6.60 - 6.68)	+63.25	1.24 (1.22 - 1.26)	1.25 (1.23 - 1.27)	1.35
Total	17.98 (17.90 - 18.05)	20.87 (20.80 - 20.94)	+16.10	6.11 (6.06 - 6.15)	4.90 (4.91 - 4.99)	-18.96

Incidence of Drug Use

Between 2015 and 2018, there was an overall 18.96% decrease in the incidence of use, from 6.11% (6.06% - 6.15%) to 4.90% (4.91% - 4.99%). This decrease was not linear, and after decreasing to 4.39% in 2016, slight increases were noted in 2017 (4.84%) and 2018 (4.95%).

A decrease in incidence was noted for all sociodemographic characteristics, ATC groups and healthcare facilities. The highest incidences and prevalences of use were noted for anti-infectives for systemic use (ATC group J) and antiparasitic products, insecticides and repellents (ATC group P).

Trends in the prevalence and incidence of drug use are shown in Table 1 and Figure 1.

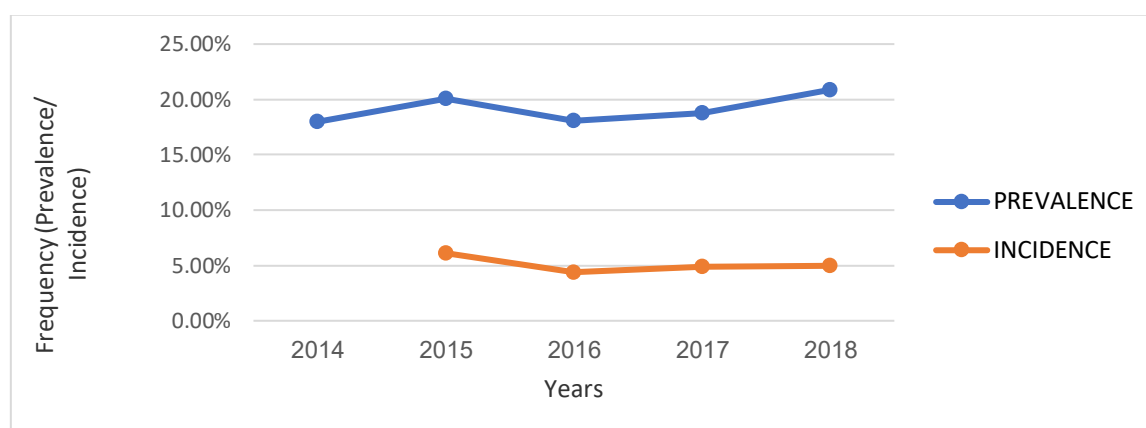


Figure 1: Prevalence and incidence of drug use from 2014 to 2018

Medicine utilisation by the main anatomical groups (ATC level I)

Total medicine utilisation increased by 28.89%, from 169.60 DID in 2014 to 218.61 DID in 2018 (Table 2). Utilisation increased in all the anatomical groups. The greatest increase was observed in groups B (blood- and blood-forming organs), J (anti-infectives for systemic use), L

(ineoplastic and immunomodulating agents) and V (various). Each year, the medicines with the highest rate of utilisation were those for the cardiovascular system (ATC group: C), anti-infectives for systemic use (ATC group: J) and those for the alimentary tract and metabolism (ATC group: A).

Table 2: Total utilisation of medicines at the level of the main anatomical groups (ATC level I)

ATC Code	Anatomical group	2014	2015	2016	2017	2018	RC
		DID (%)	DID (%)	DID (%)	DID (%)	DID (%)	(%)
A	Alimentary tract and metabolism	24.23 (14.28)	26.13 (13.81)	22.30 (14.24)	26.52 (14.40)	30.03 (13.74)	+23.93
B	Blood and blood forming organs	3.82 (2.25)	4.69 (2.48)	4.70 (3.00)	5.82 (3.16)	6.92 (3.17)	+81.22
C	Cardiovascular system	62.23 (36.69)	62.05 (32.79)	53.24 (33.99)	60.70 (32.96)	70.05 (32.04)	+12.58
D	Dermatologicals	0.55 (0.33)	0.69 (0.37)	0.50 (0.32)	0.60 (0.32)	0.72 (0.33)	+30.36
G	Genito urinary system and sex hormones	5.07 (2.99)	5.69 (3.01)	4.94 (3.15)	5.77 (3.13)	6.97 (3.19)	+37.49
H	Systemic hormonal preparations	6.82 (4.02)	8.04 (4.25)	7.11 (4.54)	8.45 (4.59)	9.93 (4.54)	+45.64
J	Anti-infectives for systemic use	27.63 (16.29)	37.34 (19.73)	27.60 (17.62)	34.67 (18.83)	42.13 (19.27)	+52.48
L	Antineoplastic and immunomodulating agents	0.52 (0.31)	0.55 (0.29)	0.52 (0.33)	0.65 (0.35)	0.78 (0.36)	+49.36
M	Musculo-skeletal system	11.28 (6.65)	12.49 (6.60)	10.24 (6.54)	12.39 (6.73)	13.76 (6.29)	+21.93
N	Nervous system	12.04 (7.10)	15.51 (8.19)	12.92 (8.25)	15.11 (8.20)	17.32 (7.92)	+43.90
P	Antiparasitic products, insecticides	8.44 (4.98)	8.19 (4.33)	6.32 (4.03)	6.10 (3.31)	10.45 (4.78)	+23.75
R	Respiratory system	6.88 (4.06)	7.79 (4.12)	6.17 (3.94)	7.30 (3.96)	9.42 (4.31)	+36.91
S	Sensory organs	0.08 (0.05)	0.08 (0.04)	0.06 (0.04)	0.08 (0.04)	0.09 (0.04)	+14.81

ATC Code	Anatomical group	2014	2015	2016	2017	2018	RC
		DID (%)	DID (%)	DID (%)	DID (%)	DID (%)	(%)
V	Various	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.02 (0.01)	+80.76
	Total	169.60 (100)	189.27 (100)	156.64 (100)	184.17 (100)	218.61 (100)	+28.89

Medicine utilisation by age group

An increase in consumption of between 12.63% and 59.29% was noted in the age groups listed. Each year, more than 66.62% of the consumption was by people aged 35–64. An

increase in consumption of more than 50% was noted among people aged 65 and over. Among young adults aged 35 to 44, the increase in consumption was 43.69% (Table 3).

Table 3: Medicine utilisation by age group

	2014	2015	2016	2017	2018	RC
AGE GROUPS	DID (%)	DID (%)	DID (%)	DID (%)	DID (%)	(%)
15-24	8.91 (5.26)	9.81 (5.19)	7.65 (4.89)	9.41 (5.11)	11.15 (5.10)	+25.09
25-34	19.31 (11.39)	21.76 (11.50)	17.86 (11.40)	19.16 (10.40)	21.75 (9.95)	+12.63
35-44	35.84 (21.13)	45.05 (23.80)	37.46 (23.91)	44.42 (24.12)	51.50 (23.56)	+43.69
45-54	37.30 (21.99)	39.85 (21.05)	31.88 (20.35)	37.49 (20.36)	43.71 (19.99)	+17.20
55-64	42.10 (24.82)	45.23 (23.89)	38.16 (24.36)	44.74 (24.29)	50.42 (23.07)	+19.77
65-74	19.79 (11.67)	20.98 (11.08)	17.99 (11.49)	22.13 (12.02)	29.97 (13.71)	+51.40
>=75	6.34 (3.74)	6.58 (3.47)	5.63 (3.60)	6.81 (3.70)	10.10 (4.62)	+59.29
Total	169.60 (100)	189.27 (100)	156.64 (100)	184.17 (100)	218.61 (100)	+28.89

3.5. Total medicine utilisation of the 20 most prescribed therapeutic groups (ATC level II)

Approximately 50% of the drugs dispensed belong to four therapeutic groups: antibacterials for systemic use (J01), agents acting on the renin-angiotensin system (C09), calcium channel blockers (C08), and drugs used

in diabetes (A10). The largest increase in consumption was noted for lipid-modifying agents (C10). These results are shown in Table 4.

Table 4: Medicine utilisation of the 20 most prescribed therapeutic groups (ATC level II)

			2014	2015	2016	2017	2018	2014-2018	RC
	ATC Code	Therapeutic group	DID (%)	DID (%)	DID (%)	DID (%)	DID (%)	DID	(%)
1	J01	Antibacterials for systemic use	26.90 (15.86)	36.72 (19.40)	27.12 (17.32)	34.10 (18.51)	41.30 (18.89)	166.14 (18.09)	+53.53
2	C09	Agents acting on the renin-angiotensin S.	29.39 (17.33)	29.51 (15.59)	25.43 (16.23)	29.31 (15.91)	30.20 (13.81)	143.84 (15.66)	+2.76
3	C08	Calcium channel blockers	16.25 (9.58)	15.52 (8.20)	12.86 (8.21)	14.23 (7.73)	15.00 (6.86)	73.86 (8.04)	-7.67
4	A10	Drugs used in diabetes	13.74 (8.10)	14.86 (7.85)	12.62 (8.06)	15.03 (8.16)	17.27 (7.90)	73.54 (8.01)	+25.66
5	M01	Anti-inflammatory and antirheumatic products	9.69 (5.72)	10.82 (5.72)	8.73 (5.57)	10.57 (5.74)	12.80 (5.86)	52.61 (5.73)	+32.05
6	N02	Analgesics	7.52 (4.43)	10.81 (5.71)	9.09 (5.80)	10.95 (5.95)	12.50 (5.72)	50.87 (5.54)	+66.24

			2014	2015	2016	2017	2018	2014-2018	RC
	ATC Code	Therapeutic group	DID (%)	DID (%)	DID (%)	DID (%)	DID (%)	DID	(%)
7	A02	Drugs for acid related disorders	6.86 (4.04)	7.77 (4.11)	6.95 (4.44)	8.42 (4.57)	10.60 (4.85)	40.60 (4.42)	+54.6
8	H02	Corticosteroids for systemic use	6.64 (3.92)	7.77 (4.11)	6.88 (4.39)	8.23 (4.47)	9.70 (4.44)	39.22 (4.27)	+46.08
9	R06	Antihistamines for systemic use	6.20 (3.65)	6.61 (3.49)	5.26 (3.36)	6.30 (3.42)	8.20 (3.75)	32.57 (3.55)	+32.3
10	P01	Antiprotozoals	6.59 (3.89)	6.36 (3.36)	4.98 (3.18)	5.93 (3.22)	7.50 (3.43)	31.36 (3.42)	+13.77
11	C07	Beta blocking agents	5.34 (3.15)	5.35 (2.83)	4.49 (2.87)	5.25 (2.85)	9.40 (4.30)	29.83 (3.25)	+75.9
12	C10	Lipid modifying agents	4.37 (2.58)	4.87 (2.57)	4.83 (3.08)	6.40 (3.47)	8.70 (3.98)	29.17 (3.18)	+98.86
13	C03	Diuretics	4.83 (2.85)	4.83 (2.55)	4.03 (2.57)	3.84 (2.08)	4.90 (2.24)	22.42 (2.44)	+1.46
14	B01	Antithrombotic agents	3.03 (1.79)	3.83 (2.02)	4.07 (2.60)	5.11 (2.77)	5.10 (2.33)	21.14 (2.30)	+68.45
15	G03	Sex hormones and modulators of the GS	3.46 (2.04)	3.78 (2.00)	3.16 (2.02)	3.67 (1.99)	4.60 (2.10)	18.67 (2.03)	+33.12
16	N05	Psycholeptics	3.45 (2.03)	3.53 (1.87)	2.81 (1.79)	3.08 (1.67)	4.20 (1.92)	17.07 (1.86)	+21.82
17	A03	Drugs for functional gastrointestinal disorders	1.90 (1.12)	1.74 (0.92)	1.31 (0.84)	1.46 (0.79)	1.90 (0.87)	8.31 (0.91)	+0.01
18	P02	Anthelmintics	1.85 (1.09)	1.83 (0.97)	1.34 (0.85)	1.34 (0.73)	1.80 (0.82)	8.16 (0.89)	-2.82
19	G04	Urologicals	0.91 (0.54)	1.11 (0.59)	1.11 (0.71)	1.32 (0.72)	1.70 (0.78)	6.15 (0.67)	+86.96
20	C02	Antihypertensives	1.20 (0.71)	1.20 (0.63)	0.90 (0.57)	1.10 (0.60)	1.40 (0.64)	5.81 (0.63)	+16.67
		Subtotal	158.92 (93.70)	177.62 (93.85)	147.07 (93.89)	174.53 (94.76)	207.37 (94.86)	865.51 (94.25)	+30.49
		Grand-total	169.60 (100)	189.27 (100)	156.64 (100)	184.17 (100)	218.61 (100)	918.29 (100)	+28.89

Discussion

This study revealed that the prevalence of consumption ranged from 17.98% to 20.87%. Despite this 16.10% increase, the overall prevalence remains low. This reflects the fact that the majority of members and beneficiaries were not using MUGEFCI services. The proportion of new users has fallen over the years. Most other studies on drug consumption do not provide an overall frequency of consumption, which makes it difficult to compare our figures with those from other countries.

With respect to the quantities of drugs consumed, there was an overall increase of 28.89% in the DID. An increase in consumption has also been noted in other studies. In Sudan, Mousnad noted an increase in consumption of 37.73.43% from 2006--2010, increasing from 97.51 DID to 134.3 DID [19]. In the Serbian Republic of Bosnia, Marković-Peković noted an increase of 131.25% from 2009-2017, increasing from 448.2 DID to 1036.3 DID [8]. Thus, drug consumption at the MUGEFCI does not deviate from this global upwards trend in consumption (and possibly expenditure), which has also been

noted in several countries [3]. This increase in consumption is a consequence of the measures taken by the MUGEFCI to make its services available. The list of reimbursable medicines has been regularly revised to include generics, in view of the epidemiological context marked by an increase in the prevalence of certain diseases (particularly chronic diseases). MUGEFCI branches have been set up in health establishments throughout Côte d'Ivoire. The increase in consumption can also be explained by changes in doctors' prescribing practices, particularly in connection with the launch of new drugs on the market.

The quantity of medicines used tends to increase over time in all therapeutic classes. The highest rates of utilisation were those for the cardiovascular system (ATC group C), anti-infectives for systemic use (ATC group J) and the alimentary tract and metabolism (ATC group A). The utilisation of cardiovascular medicines has increased in several studies [13;24;25]. These medicines play pivotal roles in the prevention and treatment of cardiovascular diseases, which are the foremost cause of mortality and disability on a global scale. In the Serbian Republic of Bosnia, cardiovascular drugs have been the most widely consumed class of drugs over time [3]. In Sudan, cardiovascular drugs constitute the 2nd most commonly consumed class of drugs, after group B drugs [19].

The breakdown of consumption by age tends to follow a bell-shaped pattern. Between the ages of 15 and 34, overall consumption remained low. From the age of 35, consumption gradually increased until it peaked between 55 and 64. After this peak, consumption fell until it reached its lowest level at the age of 75. This consumption profile is closely linked to the country's demographics, with life expectancy estimated at 59 years. The over 65s represented just 2.57% of the population in the 2021 general population and housing census [26].

However, analysis of the twenty most prescribed therapeutic groups revealed that systemic antibacterials were the most commonly used drugs. Several studies have also reported high levels of antibiotic use in various localities [20, 21; 27]. This high level of use raises the question of the rationality of their

use. This is a question that deserves to be evaluated in our context.

Conclusion

Medicine utilisation tended to increase in all ATC groups. A study of the factors that explain this growth can provide decision-makers with arguments for ensuring that they are used rationally.

Limitation of the Study

The present study offers a comprehensive description of medicine utilisation data from the MUGEFCI in Côte d'Ivoire between 2014 and 2018. A scarcity of analogous studies has been conducted in developing countries. It was therefore difficult to compare these findings with those of other studies. The study was achieved by employing DDD methodology, a valuable instrument for medicine utilisation research. This methodology is not suitable for studying the consumption of medicines by children. Children under 15 years of age represented 38.20% of the Ivorian population [26]. It would therefore be interesting to continue this analysis with that of the use of medicines in children.

Ethical considerations

The research protocol was validated by the scientific committee of the School of Pharmacy of Abidjan. The study was approved by the board of the MUGEFCI. The data were collected with respect to confidentiality.

Author contributions

YYP and colleagues extracted data from the MUGEFCI database. The data quality was checked by JK, RA and YYP. The analysis of the data and the composition of the initial manuscript were conducted by JK and KK, respectively. The final version of the manuscript was validated by RA and SO. All authors have consented to be held accountable for all aspects of the work.

Conflict of interest

The authors declare no conflict of interest.

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